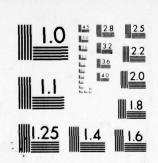
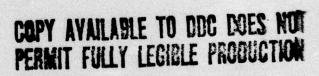
PORT AND HARBOUR RESEARCH INST TOKYO (JAPAN)
DISASTERS OF BREAKWATERS BY 11 VE ACTION (2).(U)
MAR 75 H TAKEYAMA, T NAHAYA.4A
TN-200

ACSI-K6472 AD-A036 006 F/G 13/2 UNCLASSIFIED ACSI-K6472 NL 1 oF 6 AD36006

AD A036006



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963



Approved for public release.

Distribution Unlimited so;

Of Description of the second o

Incl 2

UNCLASSIFIED

| REPORT DOCUMENTATION PAGE | READ INSTRUCTIONS BEFORE COMPLETING FORM |
|--|---|
| | NO. 3. RECIPIENT'S CATALOG NUMBER |
| Translantion No. K6472 (19) ACST | · (14) TN-200 |
| TITLE (and Subtitle) | 5. TYPE OF REPORT & PERIOD COVERE |
| 6) | |
| DISASTERS OF BREAKWATERS BY WAVE ACTION (2) | |
| 2 | 7) Technical Note No. 200 |
| 7. AUTHOR(e) | CONTRACT OF GREEN NUMBER(a) |
| Hideo Takeyama Tanekiyo Nakayama | |
| PERFORMING ORGANIZATION NAME AND ADDRESS | 10. PROGRAM ELEMENT, PROJECT, TASK |
| The Port and Harbour Research Institute | TO TOO |
| Ministry of Transportation | (3)3/9P. |
| Tokyo, Japan | 10 |
| Department of the Army | Mar Mar 75 |
| Coastal Engineering Research Center | 13. NUMBER OF PAGES |
| Kingman Building, Fort Belvoir, VA 22060 | 255 |
| 14. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Offi | ce) 15. SECURITY CLASS. (of this report) |
| | UNCLASSIFIED |
| | 154. DECLASSIFICATION/DOWNGRADING |
| | SCHEDULE |
| Approved for public release; distribution unli | |
| | |
| 17. DISTRIBUTION STATEMENT (of the abetract entered in Block 20, if differen | |
| 17. DISTRIBUTION STATEMENT (of the abetract enfored in Block 20, if different and the state of t | nt from Report) |
| 17. DISTRIBUTION STATEMENT (of the abetract entered in Block 20, if different is Supplementary notes 18. Supplementary notes 19. Key words (Continue on reverse side if necessary and identify by block numbers) Breakwaters Waves | nt from Report) mber) |
| 17. DISTRIBUTION STATEMENT (of the abetract entered in Block 20, if different in Block 20, if di | nt from Report) |
| 17. DISTRIBUTION STATEMENT (of the abetract entered in Block 20, if different for the abetract entered in Bl | nt from Report) |
| 17. DISTRIBUTION STATEMENT (of the abetract entered in Block 20, if different in Block 20, if different in Block 20, if different in Breakwaters Breakwaters Caissons Waves O. Abstract (Continue on reverse elds if necessary and identify by block management in Breakwaters O. Abstract (Continue on reverse elds if necessary and identify by block management in Breakwaters O. Abstract (Continue on reverse elds if necessary and identify by block management in Block 20, if different i | mber) |
| 19. KEY WORDS (Continue on reverse elde if necessary and identify by block numbers of 3 breakwaters damaged by wave action 1965 and 1972. Comparative data are presented where some damaged during construction to the concrete covering. Diagrams show the breakwaters damaged on the total number of breakwaters delated to the concrete covering. | mbor) have been restored between for 63 examples in 49 harbors oted, encompassing caisson se finished at least with a ers before damage was sustaine section. Simple analyses are amaged between 1965 and 1972 |
| Breakwaters Caissons 10. Agstract (Continue on reverse elde if necessary and identify by block managed by wave action 1965 and 1972. Comparative data are presented where some damaged during construction to the concrete covering. Diagrams show the breakwat the damaged condition, and the restored cross | mbor) have been restored between for 63 examples in 49 harbors oted, encompassing caisson se finished at least with a ers before damage was sustaine section. Simple analyses are amaged between 1965 and 1972 |

mx

SECURITY CLASSIFICATION OF THIS PAGE(M · STATE YES BOUNDED Consultation of the Consul Alegan and the control of the contro THE REPORT OF THE PROPERTY AND redefin dayst to Street her years and had no schools or endred by YEA Brieslave tet's A POT A A C. T. CLERGISCO ON CHEESE BOOK I NOT SERVED AND SERVED TO A A POTAL OF THE PARTY OF TH pulsation becauses mean makers are able to make been restant by the breaking The set of the second set are presented for the examples to be rettor where store deserts to the cotten, categors was moted, encompassion determine 6 Atta Page 1 to Bonziafs ezont of noticentrace without second and anada concrete events discrease show the incoherence server damage was sustained and damage continued and server are trained on the cotal number of first eventures damaged mestices and trained to the cotal number of first eventures damaged mestices and trained to the cotal number of first eventures damaged mestices and trained to the cotal number of first eventures damaged to the cotal number of first eventures damaged to the cotal number of the co ention of Your extransions CHARLES WAS ANALYZED TO WELL AND THE WELL AND THE PAGE TH

| OACSI INCLUDE TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION DATE AND TAKEYAMA AND TAKEYAMA AND TAKEKIYO NAKAYAMA DELIANCE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TOKYO, JAPAN TRANSPORTATION, NO. 200 | | TERS, DEPARTMENT OF THE ARMY | | TRANSLATION NO. | is no. |
|--|--------------------------|-------------------------------|---------------------|--|--|
| OACST MOUSE JAPANESE GEOGRAPHIC ANEA (II different from place of publication) JAPANESE GEOGRAPHIC ANEA (II different from place of publication) JAPANESE GEOGRAPHIC ANEA (II different from place of publication) JAPANESE GEOGRAPHIC ANEA (II different from place of publication) JAPANESE | | | NCE - | к-6472 | |
| JAPANESE JAPANESE IGLISH TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF COCUMENT (Complete only if different from after Immediation) HIDEO TAKEYAMA AND TANERIYO NAKAYAMA JALISHER TECHNICAL NOTE OF THE FORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 DAMENTS TORYO, JAPAN PAGE TUMBERS TARRED PAGE TOWNS AND PLACE OF PUBLICATION MARCH 1975 TORYO, JAPAN TRANSPORTATION, NO. 200 | LOUESTER | | CONTROL NO. | TRANSLATOR'S | DATE COMPLETED |
| JAPANESE JAPANESE IGLISH TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF COCUMENT (Complete only if different from after Immediation) HIDEO TAKEYAMA AND TANERIYO NAKAYAMA JALISHER TECHNICAL NOTE OF THE FORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 DAMENTS TORYO, JAPAN PAGE TUMBERS TARRED PAGE TOWNS AND PLACE OF PUBLICATION MARCH 1975 TORYO, JAPAN TRANSPORTATION, NO. 200 | OACST | | | TTPS THE | |
| DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGH VIVLE OF TRANSLATION POREIGH VIVLE OF DOCUMENT (Complete only if different from title of translation) PARE AND PLACE OF PUBLICATION MARCH 1975 TOKYO, JAPAN PARE AVION PARE | MEUAGE | GEOGRAPHIC AREA (II different | from place of publi | | |
| DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGN TITLE OF TRANSLATION POREIGN TITLE OF COCUMENT (Complete only if different from side of translation) HIDEO TAKEYAMA AND TARRETTO NARAYAMA DATE AND PLACE OF PUBLICATION RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NG. 200 PARAMETERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 POREIGN TITLE OF COCUMENT (Complete only if different from side of translation) MARCH 1975 TOKYO, JAPAN PRANSLATION RANGLATION RANG | JAPANESE | | | | |
| DISASTERS OF BREAKWATERS BY WAVE ACTION (2) Pp. 1-255 PREIGH VIYLE OF TRANSLATION POREIGH TITLE OF DOCUMENT (Complete only if different from Ride of translation) HIDEO TAKEYAMA AND TAMEKIYO NAKAYAMA USULTAKEN TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 DAMENTS TOKYO, JAPAN PARELATION TOKYO, JAPAN PARELATION TOKYO, JAPAN PARELATION PARELATION POREIGH TITLE OF DOCUMENT (Complete only if different from Ride of translation) HIDEO TAKEYAMA AND TAMELATION PARELATION TOKYO, JAPAN PARELATION PARELATION PARELATION POREIGH TITLE OF DOCUMENT (Complete only if different from Ride of translation) PARELATION PARELATION POREIGH TITLE OF DOCUMENT (Complete only if different from Ride of translation) PARELATION PA | CLISH TITLE OF TRANSL | ATION | | | LATED FROM ORIGINAL |
| POREIGN TITLE OF COCUMENT (Complete only if different from stile of timeslation) HIDEO TAKEYAMA AND TANEKIYO NAKAYAMA DOLTAME TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 TRANSPORTATION POREIGN TITLE OF COCUMENT (Complete only if different from stile of timeslation) MARCH 1975 TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN | DISASTERS OF BREA | KWATERS BY WAVE ACTION (| (2) | | |
| HIDEO TAKEYAMA AND TANEKIYO NAKAYAMA DATE AND PLACE OF PUBLICATION TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 RANGLATION RANGLATION RANGLATION TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN TOKYO, JAPAN | | | | | Fp. 1-255 |
| HIDEO TAKEYAMA AND TANEKTYO NAKAYAMA JOLISHER TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TOKYO, JAPAN PANEL ATION TANESCRITATION. No. 200 TOKYO, JAPAN TANESCRITATION TANESCRITATION TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TANESCRITATION TANESCRITATION TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TANESCRITATION TANESCRITATION TOKYO, JAPAN TANESCRITATION TANESCRITATION TOKYO, JAPAN TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TANESCRITATION TOKYO, JAPAN TOKYO, JAP | | | | | |
| HIDEO TAKEYAMA AND TANEKIYO NARAYAMA JOLISHER TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TOKYO, JAPAN RAMSLATION RAMSLATION RAMSLATION TOKYO, JAPAN | | | | | |
| HIDEO TAKEYAMA AND TANEKIYO NAKAYAMA JOSTIANO NAKAYAMA JOSTIANO NAKAYAMA TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 TRANSPORTATION TRANSPORTAT | | | | | |
| HIDEO TAKEYAMA AND TANEKIYO NAKAYAMA JOLISHER TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 TRANSPORTATION RAMSLATION TRANSPORTATION TRANSPORTAT | | | | | |
| TANEKTYO NARAYAMA JOLISHER TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 RAMELATION RAMELATION TORYO, JAPAN TORYO, JAPA | THOR (S) | FOREIGN TITL | E OF DOCUMENT | (Complete only if differen | t from title of translation) |
| TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 TRANSPORTATION, NO. 200 RAMELATION RAMELATION TORYO, JAPAN | | | | | |
| TECHNICAL NOTE OF THE PORT & HARBOUR RESEARCH INSTITUTE, MINISTRY OF TRANSPORTATION, NO. 200 MARCH 1975 TORYO, JAPAN RAMSLAVION MARCH 1975 TORYO, JAPAN | | , | DATE AND P | LACE OF PUBLICATION | |
| DETERMINE OF THE PARTY AND THE PROPERTY OF THE PARTY OF T | | | TORYO, | JAPAN | |
| District A Property A | | | TOKYO, | JAPAN | |
| TOISTRIDORCH ETATEMENT A | DMMENTS | | TOKYO, | JAPAN | |
| TOISTRIDORCH ETATEMENT A | DMMENTS | o. 200 | | | |
| TOISTRIDORCH ETATEMENT A | DMMENTS | o. 200 | | | |
| TOISTRIDORCH ETATEMENT A | DMMENTS | o. 200 | | | |
| TOISTRIDORCH ETATEMENT A | DMMENTS | o. 200 | | | - Com |
| TOISTRIDORCH ETATEMENT A | OMMENTS | o. 200 | | | 2mac III |
| TOISTRIDORCH ETATEMENT A | DMMENTS | o. 200 | | | Demark III |
| TOUTRIDOCCH CONTENENT A | DMMENTS | o. 200 | | | DIPINITE INT |
| TOUTRIDOCCH CONTENENT A | DMMENTS | o. 200 | | | OPPINALE STATUTED |
| TOUTRIDOCCH CONTENENT A | DMMENTS | o. 200 | | | DEMINE OF SERVICE OF S |
| DISTRIBUTION CONTINUENT A Approved for public release; Approved for Distribution Unlimited | DMMENTS | o. 200 | | | DEMINE OF SERVICE OF S |
| DISTRIBUTED CONTENENT A Approved for public release; Approved for Distribution Unlimited | OMMENTS | o. 200 | | | DEMINE OF SERVICE OF S |
| Approved for public release; Approved for Distribution Unlimited | OMMENTS | 6. 200 | | DE PROPERTOR OF THE PRO | DEPRINE INTURAL INTURA |
| Approved for Pulimited Distribution Unlimited | TRANSPORTATION. NOMMENTS | 6. 200 | | DIR. | DEMINE OF SERVICE OF S |
| Distribution | OMMENTS | 6. 200 | TOMON STATE | DIE A PARAGES AND A PARAGES AN | DEDENTIE SEDETUE |
| | DMMENTS | 6. 200 | TOMON STATE | DIE A PARAGES AND A PARAGES AN | DEMINE OF SERVICE OF S |

ACSI FORM 13

INTELLIGENCE TRANSLATION

DISASTERS OF BREAKWATERS BY WAVE ACTION (2)

by

Hideo TAKEYAMA and Tanekiyo NAKAYAMA

Technical Notes of the Port & Harbour Research Institute
(Ministry of Transport)

No. 200, pages 1-255. March 1975

Synopsis

More than 30,000,000 yen have been expended in restoration of some 63 breakwaters damaged by wave action between 1965 and 1972. Comparative data are presented for 63 examples in 49 harbors where some damage to the actual caissons was noted, encompassing caisson breakwaters damaged during construction to those finished at least with a concrete covering. Diagrams show the breakwaters before damage was sustained, the damaged condition, and the restored cross section. Simple analyses are attempted on the total number of breakwaters damaged between 1965 and 1972 in order to clarify any trends in breakwater damage.

Disasters of Breakwaters by Wave Action (2)

Contents

| 1. Introduction |
|--|
| 2. Methods of Recording |
| 3. Charts and Tables Recorded |
| 4. Location of Harbors and Ports Investigated 8 |
| 5. Diagrams |
| 6. Meteorological Conditions at Time of Damage 288 |
| 7. Tables of Damaged Facilities Investigated 296 |
| 8. Postscript |
| 9. Literature Cited |
| Appendix: Trends in Damage to Breakwaters |
| 1. Data Gathering and Methods of Analysis 299 |
| . 2. Analysis by Damaged Section |
| 3. Analysis of Meteorological Elements |
| 4. Number of Damaged Facilities Broken Down by |
| Damage Element |
| 5. Location of Damaged Harbors Broken Down by |
| Meteorological Elements |
| Appendix: Tracks of Various Storms |

1. Introduction

A large portion of the monies allocated to harbor construction goes for breakwaters. At the same time the cost of repairing damage to breakwaters takes up a large part of funds needed for harbor damage.

A number of studies have been made on design of breakwaters and kind of damage they sustain and there have been improvements in design. These studies are continuing even now. Very often the records of damage and what happens at different stages after damage begins are lost, and it is impossible to build up valuable experience that could be obtained from these records and used for future design.

For this reason in 1968 we assembled data on status of damage to breakwaters in the period 1949-1964 and this was published in 1968 as the Port and Harbour Research Institute report No. 58.

This report presents examples of damage to breakwaters which was not recorded in the previous report No. 58. It also attempts to make some analyses in order to ascertain any trends in breakwater damage as well as to present diagrams of damaged breakwaters.

The present report, then, aims in general at examples of damage between 1965 and 1972, but examples already included in report No. 58 are omitted to avoid duplication.

2. Methods of Recording

The total cost for restoration has been estimated at 30,000,000 yen or more for each breakwater selected, using records of restoration work on damaged breakwaters and on construction under direct control. Recording of data was made for caisson breakwaters damaged during construction or at least in the stage where concreting had been done. Even those where damage to the levee body involved shifting or breaking were selected. We relied on entries in study charts and ground plans prepared by the Hokkaido Development Bureau, District Port Construction Bureaus, and port managers.

3. Charts and Tables Recorded

Sixty-three examples in 49 ports are presented in the charts and tables as shown below with date of damage.

- 1. Monbetsu: Shima breakwater, 8-10 Jan. 1965.
- 2. Abashiri: North breakwater, 8-9 Jan. 1965.
- 3. Abashiri: North breakwater, 20 Dec. 1966.
- 4. Abashiri: East breakwater, 9 Nov. 1971.
- 5. Kushiro: North breakwater, 9-11 Dec. 1967.
 - 6. Kushiro: West harbor east breakwater, 11-13 Sept. 1971.
 - 7. Kushiro: West harbor east breakwater, 14 Feb. 1972.
 - 8. Tokachi: South breakwater, 28 Feb. 1972:
 - 9. Kutsugata: West breakwater, 28-30 Oct. 1966.
- 10. Kutsugata: West breakwater, 6 Feb. 1969.
- 11. Teuri: North breakwater, 16-17 Dec. 1965.
- 12. Yagishiri: North breakwater, 5-6 Feb. 1969.
- 13. Rumoi: South breakwater, 21 Feb. 1965.
- 14. Yoichi: South breakwater, 17 Dec. 1965.
- 15. Iwanai: West breakwater, 5-6 Mar. 1966.
- 16. Iwanai: West breakwater, 5-6 Feb. 1969.
- 17. Hakodate: West breakwater, 22-24 Mar. 1967.
- 18. Niigata (east): West breakwater, 31 Jan. 1970.
- 19. Ryotsu: North breakwater, 19-24 Jan. 1966.
- 20. Kashiwazaki: West breakwater, 19-20 Jan. 1966.
- 21. Himekawa: West breakwater, 31 Jan. 1970.
- 22. Wajima: Breakwater No. 1, 1-2 Dec. 1972.
- 23. Kanazawa: West breakwater, 14-16 Jan. 1968.
- 24. Aomori: East breakwater, Yugawa district, 28 Oct. 1967.
- 25. Shiriyamisaki: Breakwater, 21-22 Sept. 1967.
- 26. Hachinoke: Kawaraki east breakwater, 6 July 1970.

- 27. Hachinoke: Kawaraki east breakwater, 13 Jan. 1972.
- 28. Miyako: Idesaki breakwater, 16-17 Jan. 1971.
- 29. Ena: Offshore breakwater, 11-13 Sept. 1971.
- 30. Nakanosaku: Breakwater, 11-13 Sept. 1971.
- 31. Onahama: West breakwater No. 1, 29-30 April 1971.
- 32. Onahama: West breakwater No. 2, 31 Jan. 1970.
- 33. Onahama: West breakwater No. 2, 11-13 Jan. 1972.
- 34. Kashima: Outer harbor outer breakwater, 12 Jan. 1972.
- 35. Kashima: Outer harbor outer breakwater, 24 Dec. 1972.
- 36. Atami: East breakwater, 11-12 Jan. 1972.
- 37. Numazu: Outer harbor west breakwater, 17-18 Sept. 1965.
- 38. Numazu: Outer harbor west breakwater, 17-18 Sept. 1965.
- 39. Ukusu: Breakwater, 27-28 Oct. 1967.
- 40. Tagonouda: West breakwater, 17 Sept. 1965.
- 41. Hamana: East training levee, 16-17 Sept. 1972.
- 42. Hamana: East training levee, 16 Sept. 1972.
- 43. Yokkaichi: Asahi treakwater, 16 Sept. 1972.
- 44. Shiroko: South breakwater, 5-6 July 1970.
- 45. Tottori: Gare district east breakwater, 5-6 Feb. 1969.
- 46. Sakai: Outer harbor breakwater, 21 Aug. 1970.
- 47. Etsu: Suda district training levee, 23 July 1965.
- 48. Hamada: West breakwater, 4 Jan. 1971.
- 49. Wakayama Shimozu: South outer breakwater, 30 Aug. 1971.
- 50. Hiwasa: North breakwater, 28 July 1968.
- 51. Imabari: East breakwater, 21 Aug. 1970.
- 52. Murotsu: Gomen breakwater No. 1, 21 Aug. 1970.

- 53. Kurei: Futanashima breakwater, 21 Aug. 1970.
- 54. Kurei: Kamata West breakwater, 21 Aug. 1970.
- 55. Kaminogae: Kamagakubo breakwater, 21 Aug. 1970.
- 56. Shimoda: Harbor entrance training levee, 21 Aug. 1970.
- 57. Karatsu: East harbor west breakwater, 15 Feb. 1968.
- 58. Wakizaki: North breakwater, 14 Aug. 1970.
- 59. Nobeoka: South training levee, 30 Aug. 1971.
- 60. Miyazaki: Central training levee, 5 Aug. 1971.
- 61. Miyazaki: North training levee, 5 Aug. 1971.
- 62. Sendai: Training levee, 28 June-7 July 1969.
- 63. Kurio: Breakwater, 24 Sept. 1968.

The charts and tables were prepared as follows.

3.1 Survey Tables

Care should be taken for these entries in the survey tables.

(1) Date completed

As a rule, the date of completion of the site constructed in the same year as the indicated damaged section is entered, but the date of completion of the main breakwater is entered for old ones in the year constructed.

.. Those damaged during construction are indicated as "in construction.".

(2) Name of Damaging Element .

After the date of damage is placed the presumed weather condition which caused the damage, but especially in winter periods a low pressure system and winter wind waves are given as the causative or unusual weather condition. It is difficult to distinguish these, and we arbitrarily say "low pressure system" when a moving low presumed to have had an effect on the damaged port approaches near the day when damage occurred. We say "winter wind waves" when there is no such low on a particular day when damage was sustained and consider the facility to have been damaged during a winter-type western high-eastern low situation. Thus the damaging element is recorded as a low or as winter wind waves.

When, however, a moving low passes over the Sea of Japan or the Pacific Ocean, remains stationary over the Okhotsk Sea and the ocean east of Honshu, damaging waves will persist for many days and the exact day and hour are unknown. In this case the date of damage in reports from the actual locations is the continuous period of the weather element mentioned. It is difficult then to decide which element caused the damage and we simply say "low pressure system."

This was revised to low pressure system even when local reports indicated winter wind waves.

3.2 The Charts

These were recorded as indicated below and all units are metric.

(1) Location of damaged facility

The damaged site is marked in the harbor. The condition of the harbor at the time of damage is shown with dashed lines, and sections built up to March 1974 are shown with dotted lines.

When there are more than two damaged facilities, the condition of the harbor at time of damage is entered in the same place and same chart position for more than 2.

(2) Ground plan of damaged sections

These are ground plans of damaged parts and show construction style of damaged facility, cross section at time of damage, etc., and restored extensions, etc. Details of the condition at time of damage are entered if they are known objectively. Condition prior to damage is shown by dotted lines.

(3) Cross section prior to damage

Unfinished parts are shown by dotted lines for those damaged during construction in the standard cross section diagrams just prior to damage.

(4) Cross section at time of damage

Typical cross sections for one to several sections show the conditions just after damage. The condition prior to damage is given by dotted lines.

(5) Restored cross section

A standard cross section is given for the condition of the restoration after damage. As a rule restored sections, where caissons are put back in place, riprap is replenished, etc., are indicated by blackening, but this is not done where a damaged facility is not returned at all to the original form.

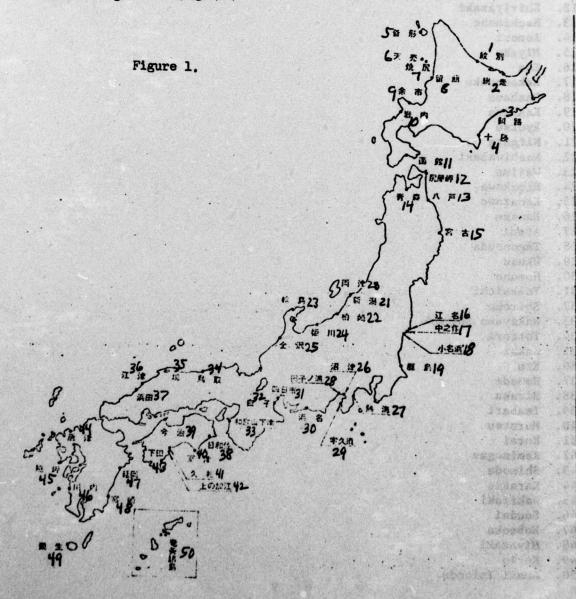
Parts of unfinished construction at the time of damage for facilities damaged during construction are indicated by dotted lines after damage when it was constructed in the same cross section as the standard cross section which was planned before the damage after restoration.

(6) Other

Details are given separately for items not shown in the damaged condition in cross section charts (3), (4), and (5) above.

4. Location of Ports and Harbors Investigated

This is given in Figure 1.



the contract was planned before the Power after wastiful and

ioù listendes : vir are ellere. (b) Listen, coliose seore et acrille.

Learnightent north at a till

seems brefigge and as collass many trais and of persons and the seems as the Key:

- Monbetsu
- Abashiri
- Kushiro in an an area are apply the little research Tokachi and the base the country of the 3.
- 4.
- 5. Kutsugata
- 6. Teuri
- 7. Yagishiri
- 8. Rumoi
- 9. Yoichi
- 10. Iwanai
- 11. Hakodate
- 12. Shiriyazaki
- 13. Hachinohe
- 14. Aomori
- 15. Miyako
- 16. Ena
- Nakanosaku 17.
- 18. Onahama
- 19. Kashima
- 20. Ryotsu
- 21. Niigata
- 22. Kashiwazaki
- 23. Wajima
- 24. Himekawa
- 25. Kanazawa
- 26. Numazu
- 27. Atami
- 28. Tagonouda
- 29. Ukusu
- 30. Hamana
- 31. Yokkaichi'
- 32. Shiroko.
- 33. Wakayama Shimozu
- 34. Tottori .
- 25: Sakai
- 36. Ezu
- 37. Hamada
- Hiwasa 38.
- 39. Imabari
- 40. Murotsu
- 41. Kurei
- 42. Kaminogae
- 43. Shimoda
- 44. Karatsu
- Wakizaki
- 46. Sendai
- 47. Nobeoka
- 48. Miyazaki
- 49. Kurio
- Amemi Islands

5. Tables and Charts of Damaged Breakwaters

Left page includes keyed tables and diagrams; facing page lists items keyed.

BELLEVICE TO THE REST OF THE PARTY OF THE PA

| /地区施设名 2.2.15改块 S完成年月日 6 约工中 | | | | 改堤 | 対数様式 4ケーソン式混成堤 一 フ破災年月日 8昭和 40年1月8日~10日 9(低気圧) | | | | | | |
|---------------------------------|------|------------------|-------------|---|--|-------------|-----------|-------|--------------|----------|-----|
| | | | | | | | | | | | |
| 被状 | 10 英 | Market Committee | | より70mに亘 散乱の弦災を生 | って、本体ケーソン、 じた。 | 松園プロッ | ク. 被 | 質テリ | ラポッ | F. 恭健! | ė |
| | 13 | | | | 寸 /5 法 8.5×10.6 何號 0.45 m 医壁 0.3m 底版 0.45 m 化 | | | | | | |
| | 立 | 1 | 14,, | シンパート 鉄 18 版 | σ ₂₆ = 210 kg/cd | | | | | | |
| 12 | 部 | | | 中 /9 結 | | | 位体链 | TE LA | 20 4 | ر د | |
| 被 | 和 | 上級 | 地所 打 | 129リート | 約1:3:6 | | UL PP (M. | | 2.0 17 | - | |
| | 23 | | 24 石 | | 122 | | | | | | |
| 災 | 捨 | | 26 I | 卷外, 2 t/ | 間テトラボッド 花 | 内. なしる | 27 | | | | |
| | 石 | 根間 | 38., | 務外内と そ9 | B H L 2.5 × 1.5 × 3.5 | | | | | | |
| | 部 | 俏彼 | 30,0 | te 131 | | | | | | | |
| 前 | | 构色 | 多格石 | ts L 31 | | | | | | | |
| | 33 t | 0 | 他 | ts L 31 | | | | | | | |
| | 20 | 34 数計資料 | | 技 35 高 | | | 36 | | 新统 | 37 | |
| | | a- | | 周 38 期 | | | 39 M | A | p= | 150. | |
| | 4/被 | 道 | | 827 ~ p | 6面 最大15.0m | 43 | | | | | |
| 114 | 被 | Ý. | | 45 梅 科 | | | | | | | |
| 40 | 英 | 部 | | 政制 の状況 | | | スライド | した | とけであ | \$ 47 | |
| | | 23 | 故权 | 480 K A | 校園プロックに含む | ot 49. | | | | | |
| | 數 | 指数数 | | BO N BI | 卷外, 延長 20m 約70m 港内, 延長 70m 約200m 57 | | | | | | |
| 災 | R | 部 | 根闘ブ | 5.70 放乱 港外, 延長 10m 6個 - 港内, 延長 70m 51個 53 | | | | | | | |
| | | · 商技 £ 6 数 | | 子% K & | 10年10年10日 10日 10日 10日 10日 10日 10日 10日 10日 10日 | | | | | | |
| | | 33 | * | の 他 | - | | | | | | |
| 码 | | 55 自然条件 技 | | 35 A. | Hmax 4~5 m (B | 制 | 38 | 期 | 8~1 | 1 ac | |
| | | | | 57 向 | NE | M | 58 | 位 | + 1.6 | a | |
| • | ١. | | | 835989 MI | NE方向 15~20 | | 61 | 选 | 平约1 | 0~228 | /80 |
| | 63 方 | | | 役旧とするが、 酸にて被優した | 特化堤頭部および使P 。 64 | i#i7 0 m f | | | 聞テト : | 1 | |

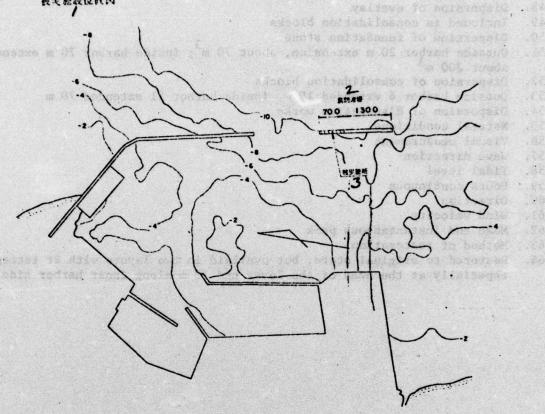
1. Monbetsu Harbor

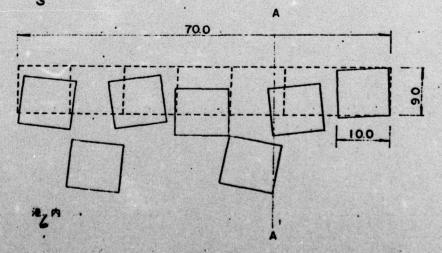
- 1. Regional facility name
- 2. Shima breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 8-10 Jan. 1965
- 9. Low pressure
- 10. Damage status
- 11. Damage to the caissons, consolidation blocks, overlay tetrapods, and foundation mound was caused by shifting and scattering.
- 12. Prior to damage
- 13. Vertical part
- 14. Caisson
- 15. Dimensions
- 16. Sidewall 0.45 m, compartment wall 0.3 m, base plate 0.45 m
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Sand. Unit volume weight 20 t/m²
- 21. Upper concreting in site
- 22. About 1:3:6
- 23. Riprap area
- 24. Foundation mound
- 25. 30-300 kg/piece
- 26. Overlay
- 27. Outside harbor 2t tetrapods, inside nothing
- 28. Foundation blocks
- 29. Both inside and outside harbor
- 30. Precast concrete armor units
- 31. None
- 32. Dissipating riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. Time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. 6. Maximum 150 m.
- 44. Slope of levee body
- 45. Maximum 5°

- 46. State of levee body damage
- 47. No damage to caisson, only slippage
- 48. Dispersion of overlay
- 49. Included in consolidation blocks
- 50. Dispersion of foundation stone
- 51. Outside harbor 20 m extension, about 70 m³; inside harbor 70 m extension, about 200 m³
- 52. Dispersion of consolidation blocks
- 53. Outside harbor 6 extended 10 m, inside harbor 51 extended 70 m
- 54. Dispersion of dissipation works
- 55. Natural conditions
- 56. Visual measurement
- 57. Wave direction
- 58. Tidal level
- 59. Hours continuous
- 60. Direction
- 61. Wind velocity
- 62. Mean and instantaneous peak
- 63. Method of restoration
- 64. Restored to original state, but overlaid in two layers with 2t tetrapods, especially at the head of the levee and 70 m along inner harbor side.

17. So doneye to caleson, chir willymore





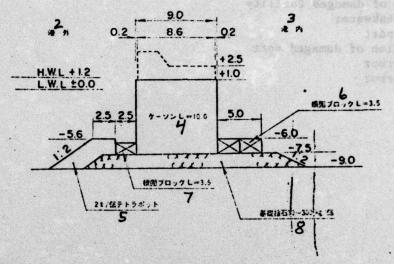


1. Monbetsu Harbor

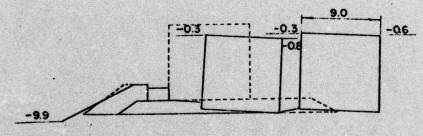
子其一人 经高额销售价值

- 1. Location of damaged facility
- 2. Shima breakwater
- 3. Damaged part
- 4. Ground plan of damaged part
- Outer harbor
 Inner harbor

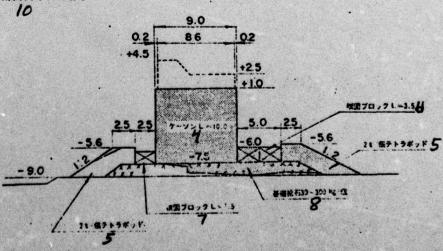
被災前断所図(A-A)



被災時期而四(A—A)



復旧断而図(A-A)



1. Monbetsu Harbor

THE RESIDENCE OF STREET Key: 1. A-A cross section prior to damage Outer harbor 3. Inner harbor Caisson 2t tetrapods 6. Consolidation blocks 7. Consolidation block 30-300 kg foundation mound 9. A-A cross section at time of damage A-A cross section restored provide the party of the property of MU TO GO AT THE STATE OF THE (株會) STATE OF THE STATE OF THE PROPERTY OF THE PROPERTY OF THE PARTY OF THE ANTHORN THE PROPERTY OF THE PARTY OF THE PAR

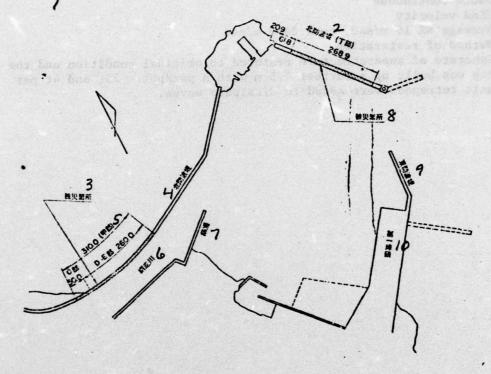
| | • | T | | 为核堤(T) | 3構造様式 4ケーソン式混成堤 | | | | |
|---------------|--|--|-----------------------|--|--|------------|---|--|--|
| 完成年月日 6昭和20年代 | | | | t | 7被災年月日 8昭和 4 0 | 年1月8~9日 | 9(低気圧) | | |
| 枚状 | 10 災 | F | 部工延長 | 162.0m 根照 | J. 268.9 mが破壊され | t. | rodend vare inchestern nosern spegario | | |
| | 13 | | 14 | す 15 生 | 1100000 | 3.材厚不明/4 | | | |
| | 並 | 4 | - 72 | # 18 m | 1:5:10 | | | | |
| 12 | 新 | | | 中 20 結 | | 単位体積重量 | 不剪 | | |
| | | 上部 | 場所打 | ンクリート | 1:3:6 | | | | |
| | 23 | y, c | | 300~100 | 0 kg/@ 25 | | | | |
| 災 | 榆 | CO. 17 (F) | 76 I | ts L 27 | | 20 | | | |
| | 75 | | 38,0 | CONTRACTOR OF THE PERSON NAMED IN COLUMN 1 | 6.1 × 6.4 × 9.0 9 | 徳内・根壁クーン | 2 6.1 × 6.4 × 9.0 9 | | |
| | 2 | - | 30,, | 1 127 | | | | | |
| 的 | _ | | 2 拾 石 | # 127 | | | | | |
| | 32+ | | | ts 127 | r | | T | | |
| | . 16 | # 33 # £ | t #4 | 数 34 萬 期 | 不明19 | 故 35 E | 不明/4 | | |
| | | 13 | B 提 4 30, ~ | | ts 127 | 1 1 1 1 | 1 4 2/1 | | |
| | 39 | | | 46 45 84 12 127 | | | | | |
| 38 数 | 英 | 都 | 提体 | 数面の状況 | 贝上部工数据。 经长 13 | 2.0 m | | | |
| | | 23 拾石部 | 被权 | 40 数 & | | • | | | |
| | 数 | | | 岩の数乱 | | | | | |
| 英 | 额 | | 収置ブ | 45,00th | STATE OF THE STATE | E長268.9m46 | | | |
| | | STATE AND DESCRIPTION OF THE PARTY OF THE PA | | 470 枚 乱 | <u> </u> | | | | |
| | | 32 | | O fe | - | · · · · · | | | |
| 84 | | 48 B | | 34 * | H 1/3=5.5 m | 周 36 期 | | | |
| | 自然 | 新Ħ | 教 | 粉的問 | 不明19 不明19 | 用 50 位 | 不 明 19 平均NE 1 6 m/sc 瞬間最大 24.3 m/sc | | |
| | <u>. </u> | | | | | | | | |
| 便 | 54 H # | 独 | SUPPLIES PARTY STATES | | R形に復旧し、さらに天 「例テトラボッドにて格」 | | ラベットで施工し、 | | |

2. Monbetsu

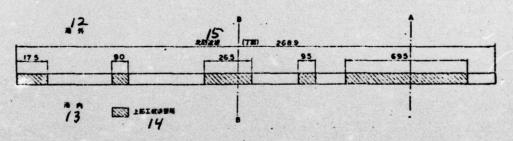
- 1. Regional facility name
- 2. North seawall
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1955
- 7. Date damaged
- 8. 8-9 Jan. 1965
- 9. Low pressure
- 10. Damage status
- 11. 162.0 m of superstructure extension and 268.9 m of consolidation works destroyed
- 12. Prior to damage
- 13. Vertical part
- 14. Caisson
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. Unknown
- 20. Fill
- 21. Concrete. Unit volume weight unknown.
- 22. Upper concrete in site
- 23. Riprap
- 24. Foundation mound
- 25. Per unit
- 26. Overlay
- 27. None
- 28. Consolidation blocks
- 29. Outer harbor, caissons; inner harbor, caissons
- 30. Precast concrete armor units
- 31. Dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Period
- 37. Angle of incidence
- 38. Time of damage
- 39. Amount of damage
- 40. Levee body slide
- 41. Levee body slope
- 42. Condition of levee body damage
- 42a. Damage to superstructure, extension 132.0 m
- 43. Scattering of overlay
- 44. Scattering of foundation mound
- 45. Scattering of consolidation blocks

- 46. Consolidating caisson destroyed, extension 268.9 m
- 47. Scattering of dissipation works
- 48. Natural conditions
- 49. Wave direction
- 50. Tide level
- 51. Hours continuous
- 52. Wind velocity
- 53. Average NE 16 m/sec, peak 24.3 m/sec
- 54. Method of restoration
- 55. Concrete of superstructure restored to original condition and the top was built up a further 4.5 m with a parapet. 25t and 4t per unit tetrapods were added to dissipate waves.

被災施設位疑問



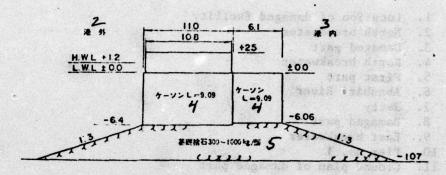
被災傷所平面図 //



2. Abashiri Harbor

- 1. Location of damaged facility
- 2. North breakwater
- 3. Damaged part
- 4. North breakwater
- 5. First part
- 6. Abashiri River
- 7. Jetty
- 8. Damaged part
- 9. East breakwater
- 10. Pier no. 1
- 11. Ground plan of damaged part .
- 12. Outer harbor
- 13. Inner harbor
- 14. Damaged parts of superstructure
- 15. North breakwater

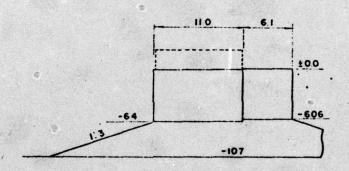
被災前断面図(A-A)



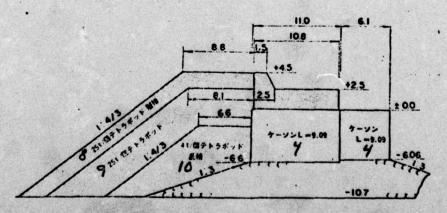
managed garin att surveys togense

anversion of the

数災時断面図(A-A)



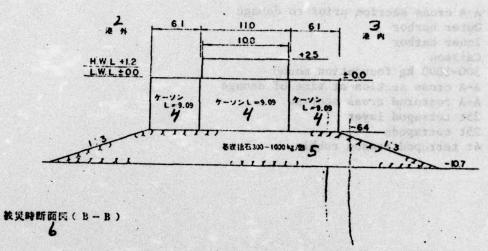
後旧断面図(A-A) フ

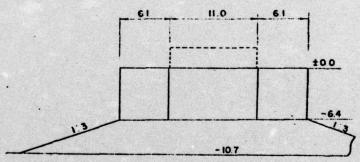


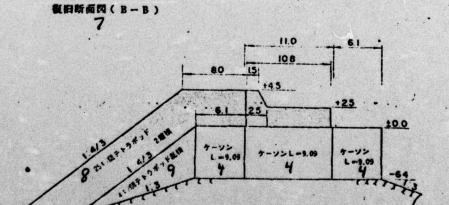
2. Abashiri Harbor

- 1. A-A cross section prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. 300-1000 kg foundation mound
- 6. A-A cross section at time of damage
- 7. A-A restored cross section
- 8. 25t tetrapod layer
- 9. 25t tetrapods
- 10. 4t tetrapod random rubble

被災前断而閃(B-B)







2. Abashiri Harbor

Key:

- 1. B-B cross section prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. 300-1000 kg foundation mound
- 6. B-B cross section at time of damage
- 7. B-B restored cross section
- 8. 25t tetrapods
- 9. 4t tetrapod random rubble

W 1224 W

运输和 24 中国总统为主持政策

| 地 | X 施 | 2 4 | 2北日 | 方故堤(甲) | | | 32 | クリート式提放場 | £ | |
|---------------|------------|----------|--------------|---------------|--------------------------------|------------|-----|---|---|--|
| 了完成年月日 | | | 一門和初 | RA C | 被炎年月日 9昭和41年12月20日 | | | 9(低氣圧 |) | |
| ** | 0 元 | 20.5 | 夏石が登場 | .し上部工が16 | 0mに亘って欠扱した。 | | | ors ezoni 8 Sodijai ing Sadijai ing | | |
| | 13 | 1 | | 7 15 th | B H 3.0 × 1.6 | n abrish | | na con co | | |
| | | | 所打 | コンダート | 1:3:6 | all In in | | Park CEATA (| | |
| 15 | 立 | עב | 11-+ | 美 17 筋 | # L18 | | | shaperior a | | |
| 12 | 85 | | | 中 19 結 | te LB | Action 600 | | I beds 2391 | | |
| | | 上鄉 | 場所打2 | 1899-1 | | | | | | |
| | 21 | 28 8 | 计 石 | 30~100kg | /酸23 | | | | | |
| 災 | 桧 | 被 | T | 能外内とも指す | 5 1 0 0kg/健 25 | | | | | |
| | 75 | | %,, | 选外 1.5×1. | 5 × 3.0 | | | | | |
| | 15 | 而故 | 34,, | # L18 | | | | | | |
| 69 | | m t | 列 石 | te L 18 | | | | | | |
| | 30 t | 0 | 他 | te L18 | | | | | | |
| | 20. | 31, | s t t | # 32 A | 不明33 | 故 34 | Æ | 不明33 | | |
| | 6 | | | m 35 m | 不明33 | 人36时 | A | 本 男 33 | | |
| | 20 | 13 | 提件 | 8 ナベリ | × 9 2 4 18 | | | | | |
| | 32 | * | 2 4 | 48 M N | 2 48 | | | | | |
| 37 N | 爽 | 野機体 | | 数似の状況 | 上部工160m欠换 42 | | | | | |
| | 散 | 24 | 被权 | Fon a | 港外内とも被災あり、数量不明 44 | | | | | |
| | EX. | 5 | 2 0 | おの数数 | te L18 | | | | | |
| * | 12 | | | おきりの数数 | tz L18 | | | | | |
| | | | 前数至6数数 | | | | | | | |
| | | 36 | | 0 16 | | | | | | |
| * | 4 | 8 | 枚 | 32 × | H1/3-4.0m(日間) | N 35 | M | 不 明 33 | | |
| | 自然 | 自然条件 茂 | | 570 pj | N 6 0° E | m 51 | R | +1.14m | | |
| | | | 10 | 65245 FU | 不明33 | ■ 53 | ž. | 平的NW115m/w 時間於大NW18.7m | / | |
| 2 1 | 65 B 25 | 怯 | *66 | びが散風した状態 | されば 4 1 / 位 テトラボ 5 6 | ッドにて希波 | C#: | 双十九。 | | |

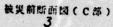
3. Abashiri Harbor

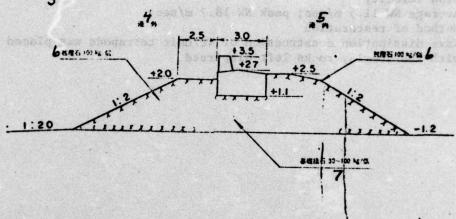
- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. In site concreted breakwater
- 5. Date completed
- 6. 1925-1926
- 7. Date damaged
- 8. 20 Dec. 1966
- 9. Low pressure
- 10. Damage status
- 11. Overlay rocks dispersed, superstructure overreached and destroyed
- 12. Prior to damage
- 13. Vertical part
- 14. Upper concreting in site
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. None
- 19. F111
- 20. Upper concreting in site
- 21. Riprap
- 22. Foundation mound
- 23. 30-100 kg/piece
- 24. Overlay
- 25. Riprap 100 kg/piece inside and outside harbor
- 26. Consolidation blocks
- 27. Outside harbor
- 28. Precast concrete armor units
- 29. Dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Unknown
- 34. Wave pressure
- 35. Period
- 36. Angle of incidence
- 37.. At time of damage .
- 38. Amount of damage
- 39. Levee body slide
- 40. Slope of levee body
- 41. Condition of levee body damage
- 42. 160 m of superstructure destroyed
- 43. Dispersion of overlay
- 44. Have damage inside and outside harbor, amount unknown
- 45. Dispersion of foundation mound

- 46. Dispersion of consolidation blocks
- 47. Dispersion of dissipation works
- 48. Natural conditions
- 49. Visual
- 50. Wave direction
- 51. Tide level
- 52. Duration
- 53. Wind velocity
- 54. Average NW 11.5 m/sec; peak NW 18.7 m/sec
- 55. Method of restoration
- 56. Wave dissipation construction of 4t/unit tetrapods was placed in front with the overlay rocks left dispersed.

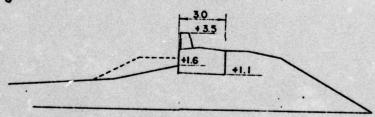
被災施設位的問

② 科走港北防波堤(T)参照 2

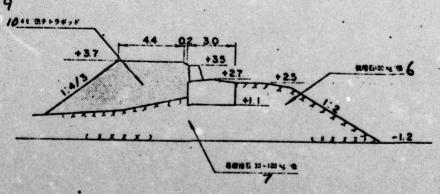




被災時所而図(C部)

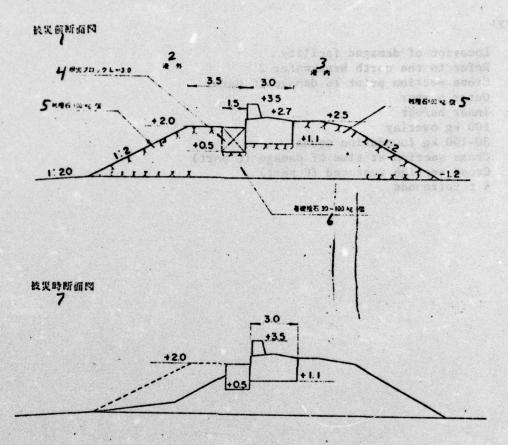


復旧新而図(C部)

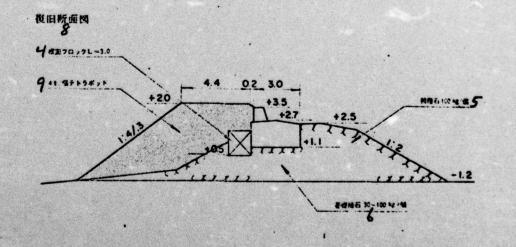


重媒

- 1. Location of damaged facility
- 2. Refer to the north breakwater 2
- 3. Cross section prior to damage (C part)
- 4. Outer harbor
- 5. Inner harbor
- 6. 100 kg overlay7. 30-100 kg foundation mound
- 8. Cross section at time of damage (C part)
- 9. Cross section restored (C part)
- 10. 4 t tetrapods



#1



Key:

- Cross section prior to damage
- Outer harbor
- 3. Inner harbor
- Consolidation blocks
- 100 kg overlay
- 30-100 kg foundation mound
- Cross section at time of damage 7.
- Restored cross section
- 4t tetrapods

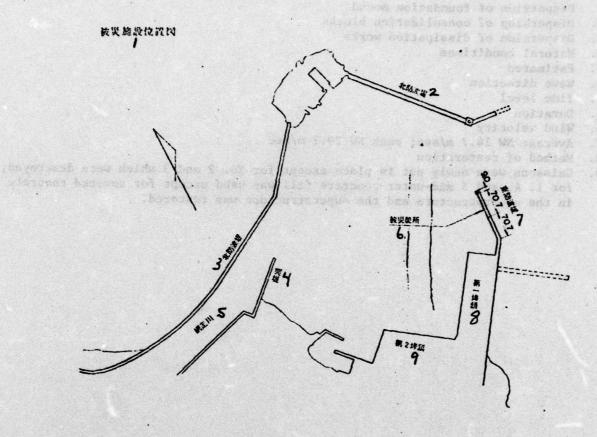
· 如《相切》在"

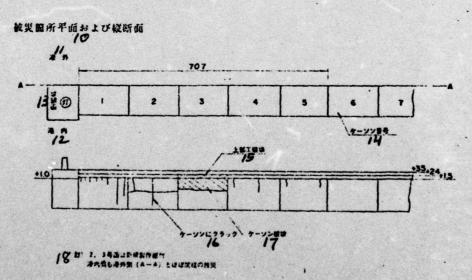
LITERAL TOWNERS ASSESSED AND APPROPRIEST AND ADDRESS.

| | | T | 24 1 | 次 堤 | | 棋式 45- | | | | | |
|-----|-------|--------------|--|----------------------|--------------------------------------|--------------------------|----|---------------|------------------------|--|--|
| 完成 | 年月日 | 683 1 | 138年 | | 7被災年月日 8昭和 4 6年1 | 1月9日 | | 9(| 低気圧) | | |
| 被状 | 10 炭 | 3 45 | 調が破損 | LI. 2. 4. | 5号版に数 1/ ~ 50 1/ 6 | で達する亀製 | を生 | じた。 | | | |
| | 13 | チーソン 美 ! | | す /5 株 | セメント使用最330kg/㎡ /8 32.3kg/㎡ SS39および41 | | | | | | |
| ル数 | 立即 | | | | | | | | | | |
| | | | | 中 21 结 | | | | | | | |
| • | " | | | | 不 钥 24 | | | | | | |
| | 25 | 张 6 | | 100~300 | | | | | | | |
| 災 | | | 18 I | | 石1.01/假 29 | 1 | | | | | |
| | Ti | | 32,0 | 3/ 30/1.3/14.1 | | | | | | | |
| 前 | 都 | | 3% 石 | t L33 | | | | | | | |
| | 35 t | 0 1 | | ts 133 | | | | | | | |
| | | 发 計 資 料 | | 故 37 高 | H 1/3 = 4.0 m | 波 38 | B. | 不明 | 24 | | |
| | | ат ж | | 炒 39 期 | 1 Osec | 入40 射 | 角 | N 60° | E | | |
| | 42 | 13 | Control of the Control | ¥3., ~ , | | | | | | | |
| | 被 | 立 | 缇 体 | | ts 173 | | | | | | |
| 被被 | 災 | 25 被股格 | | 改物 の状況 | ts 133 | | | | | | |
| | | | | 10 版 乱 | | | | | | | |
| | 数 | | | 石艺教制 | | | | | | | |
| 炎 | | 部 | THE PROPERTY OF THE PARTY OF TH | 4970款乱 | | | | | | | |
| | | | 俏莜 | 150 散 乱 | - | | | | | | |
| | | 35 | ŧ i | ひ・他 | | | | | | | |
| Bly | | 51 自然条件 被 | | 37 % | H 1/3-3.7 m (程定) | N 39 | 赐 | 9.0 sec | | | |
| | | | | 53 m | NE . | M 54 | 位 | +0.76 | i m | | |
| | | | 赵 | 既55 _时 100 | 不明24 | E 58 | × | 平均KII 時間最大 | 14.7 m/sec NW 292m/ | | |
| 被(| 58 店方 | 技 | 5 19 | | たケーソンを除去し行たにク 塩コンクリートを除去し中部 59 | The second second second | | | | | |

- Regional facility name
- 2. East breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- Date completed
- 6. 1963
- 7. Date damaged
- 8. 9 Nov. 1971
- 9. Low pressure
- 10. Damage status
- 11. No. 3 unit destroyed, 1, 2, 4, and 5 had cracks up to several to 50 m/m
- 12. Prior to damage
- 13. Vertical part
- 14. Caisson
- 15. Dimensions
- 16. Sidewall 0.5, compartment wall 0.3 m, base plate 0.5
- 17.
- Concrete 2 33.0 kg/m cement used 18.
- 19. Reinforcing steel
- 20. 32.3 kg/m³, SS39 and 41
- 21. F111
- Sand, unit volume weight 20t/m³ 22.
- 23. Upper concreting in site
- 24. Unknown
- 25. Riprap part
- 26. Foundation mound
- 27. Per piece
- 28. Overlay
- 29. Riprap at 1.0t/piece both inside and outside harbor
- 30. Consolidation blocks
- 31. Outside harbor poured concrete
- 32. Precast concrete armor units
- 33. None
- 34. Dissipation riprap
- 35. Other
- 36. Design data
- 37. Wave height
- 38. Wave pressure
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide
- 44. Slope of levee body
- Condition of levee body damage

- 46. One caisson destroyed, cracks in 4 others
- 47. Dispersion of overlay
- 48. Dispersion of foundation mound
- 49. Dispersion of consolidation blocks
- 50. Dispersion of dissipation works
- 51. Natural conditions
- 52. Estimated
- 53. Wave direction
- 54. Tide level
- 55. Duration
- 56. Wind velocity
- 57. Average NW 14.7 m/sec; peak NW 29.2 m/sec
- 58. Method of restoration
- 59. Caissons were newly put in place except for No. 2 and 3 which were destroyed; for 1, 4, and 5 mid-water concrete fill was used except for covered concrete in the superstructure and the superstructure was restored.



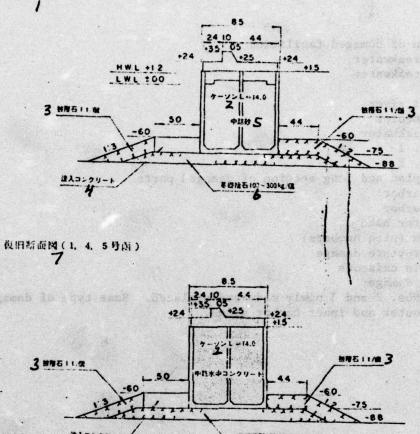


Key:

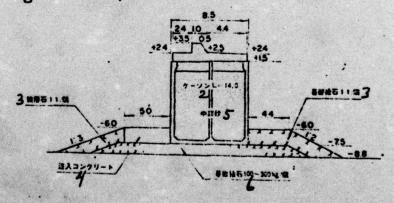
- 1. Location of damaged facilities
- 2. North breakwater
- 3. North breakwater
- 4. Jetty
- 5. Abashiri river
- 6. Damage sector
- 7. East breakwater
- 8. Pier No. 1
- 9. Pier No. 2
- 10. Ground plan and long section of damaged parts
- 11. Outer harbor
- 12. Inner harbor
- 13. Breakwater head
- 14. Caissons (with numbers)
- 15. Superstructure damage
- 16. Cracks in caissons
- 17. Caisson damage
- 18. Note: Nos. 2 and 3 newly made and emplaced. Same type of damage to A-A on outer and inner harbor sides.

南中国教育

被災前新而四



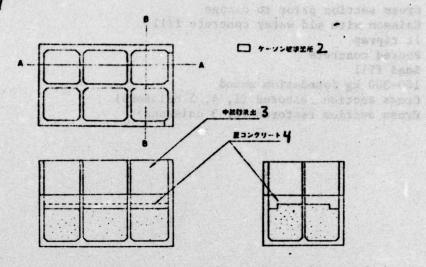
復旧断面四(2、3号函)



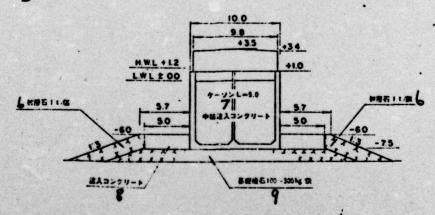
- 1. Cross section prior to damage
- 2. Caisson with mid water concrete fill
- 3. lt riprap
- 4. Poured concrete
- 5. Sand fill
- 6. 100-300 kg foundation mound
- Cross section restored (1, 4, 5 caissons)
 Cross section restored (2, 3 caissons)

④ 網 走 港

3 号函数模状况图



提到海斯面网



Key: Condition of damage to caisson 3 Damaged part of caisson Sand fill discharged Concrete Cross section of breakwater head caisson 1 t overlay Caisson L = 9.0. Poured concrete fill. Poured concrete 100-300 kg foundation mound act of a blan 图 35 E F F F punger allege at a set Les al la he al 1887 and mon 3 se a 老者 20 10 10 4537 M 18 18 THE BEST TOWARD TO CATON OUT THE PROPERTY OF THE - entrance are a constant and a second and a

| tit: | 以施 | 设名 | 2北 % | 放堤 | BMZ | UK Y | 70 ; | 1) | 、 | | |
|--------|----------|------------|---|---------------------|--------------------------------------|-------------------------------------|-------------|-----|--|--|--|
| 完成 | 年月日 | 64 | 正12年 | ~%和11年 | 7被英年月日 83和4 2年 1 | 1月9 | ~11 | B | 9(低気圧) | | |
| 故状 | 10 元 | 100000 | | 組され基礎物石 をうけた。 | が散乱しそれに伴い機固プ! // | D y 9 t | :8 <u>4</u> | LÆ | 。 また,上部工が | | |
| | 13 | | | す /5 株コングリート | 3.63×1.81×不明6 | 2.4 2 × | H (1.8) | × | L ₅₉₇ /6 | | |
| | 立 | 7 . | 14, | | NAME OF TAXABLE PARTY. | a 054 | S. J. | | 2, 52 U.S. UUL | | |
| 12 | 1 55 | | | 中 20 指 | 12 L19 | - | + | | | | |
| W. | BP | 1- 85 | 照所 2 | ンクリート | 不明化 | | + | | | | |
| | 22 | | 2/1 6 | 30~300kg | | + | + | | | | |
| 災 | 拾 | | 75 I | te 1.19 | | + | + | | | | |
| | 5 | 极問: | 36., | 進外。B(1.82×1.81×不明16 | | | | | | | |
| | 部 | 消 陵 | 38,, | ts L 19 | | | | | | | |
| 前 | | 带 帮 | 24 石 | ts 19 | | | | | | | |
| | 302 | 0 1 | 他 | * 19 | | | | | | | |
| | | R #3 H | | 故 32 高 | 不 明16 | 故 | 33 | Æ | 不明16 | | |
| | | | | 周 34 明 | 不明化 | 125 | 利 | A | 不明化 | | |
| | 37 | 13 | - | 38+ ~) | 2 6 19 | | | | | | |
| × | 枝 | | | 38 核 料 な し19 | | | | | | | |
| X 被 | 英 | | | 110 状况 | 上部工 325.2m 破線 4 | <u>+1</u> | | | | | |
| | B | 22 | | for a | - | | *** | | | | |
| | | 5 | | 45,0000 | | 外,延長245.5m 数量不明44 長245.5m 数量不明44 | | | | | |
| 炎 | 2 | 部 | HOUSE DESCRIPTION OF THE PARTY | To R A | | | | | | | |
| | | 30 | SPHONE CHARLES (MICH.) | の・他 | | | | | | | |
| 额 | | 自然条件 数 | | 32 A | Hmax = 40m(日間) | Ri | 34 | W | 不明从 | | |
| | 自然 | | | 50 向 | 不 明 16 | | 51 | (t) | | | |
| • | | | | +524 NJ | 不明16 | - | 53 | * | 瞬間最大 2 3.4 m/sec | | |
| 55 製作 | | | 07 | | Hでは境体の総特がむずかし がに復旧し、21/数中空三 56 | | | | | | |

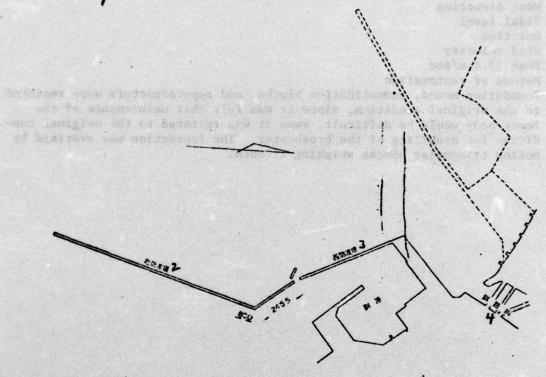
- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Block type composite breakwater
- 5. Date completed
- 6. 1923-1936
- 7. Date damaged
- 8. 9-11 Nov. 1967
- 9. Low pressure
- 10. Damage status
- 11. The front of the levee body was scoured and the foundation riprap dispersed with consequent shifting of consolidation blocks. Damage also received by destruction of superstructure.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. None
- 20. Fill
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per block
- 25. Overlay
- 26. Consolidation blocks
- 27. Outside harbor
- 28. Precast concrete armor units
- 29. Dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Period
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope
- 40. Condition of levee body damage
- 41. 325.2 m of upper section destroyed
- 42. Dispersion of overlay
- 43. Dispersion of foundation mound
- 44. 245.5 m extension outside harbor, amount unknown
- 45. Dispersion of consolidation blocks

- 46. 245.5 m extension, amount unknown
- 47. Dispersion of dissipation works
- 48. Natural conditions
- 49. Measured visually
- 50. Wave direction
- 51. Tidal level
- 52. Duration
- 53. Wind velocity
- 54. Peak 23.4 m/sec
- 55. Method of restoration
- 56. Foundation mound, consolidation blocks, and superstructure were restored to the original condition, since it was felt that maintenance of the levee body would be difficult, when it was restored to the original condition for stability of the breakwater. The foundation was overlaid by hollow triangular blocks weighing 2t each.

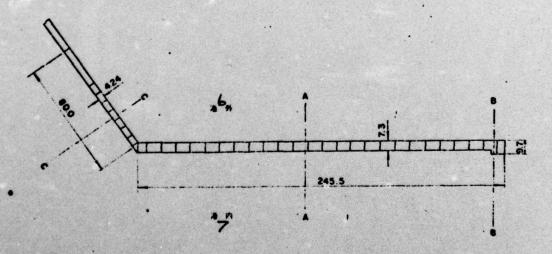
ra i notamates de E. 255 da

worlding inteless

被災施設位置因



被災國所平面內 5



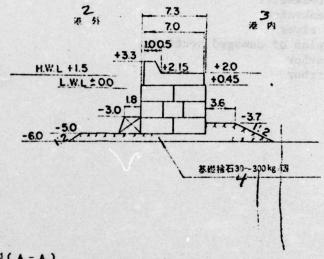
5. Kushiro

Key:

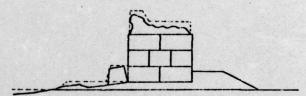
- 1. Location of damaged facilities
- 2. North breakwater
- 3. West breakwater
- 4. Kushiro river
- 5. Ground plan of damaged sections
- 6. Outer harbor
- 7. Inner harbor

William Walland

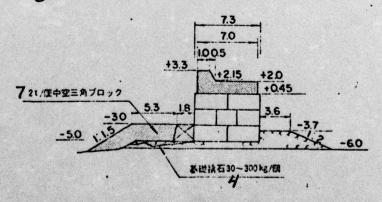
被災前時面内(A-A)



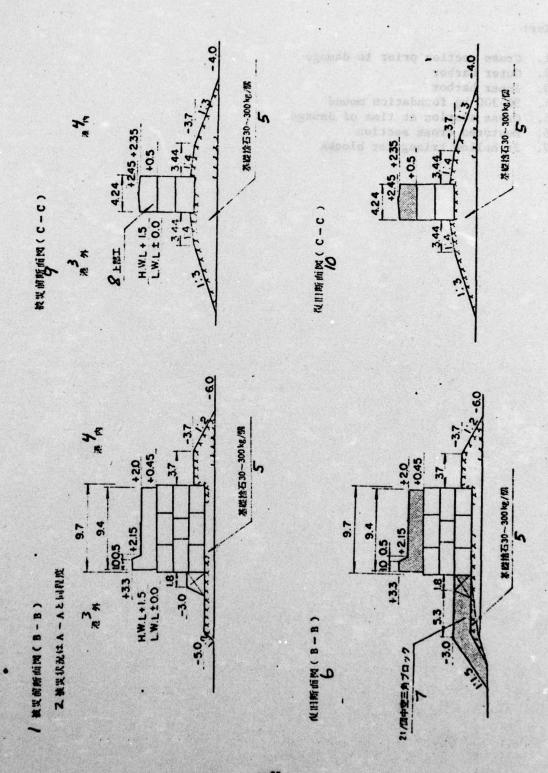
被災時結而的(A-A)



復旧所面段(A-A)



- 1. Cross section prior to damage
- 2. Outer harbor
- Inner harbor
- 30-300 kg foundation mound
- 5. Cross section at time of damage6. Restored cross section7. 2t hollow triangular blocks



Key:

- 1. Cross section prior to damage
- 2. Damage status about the same as A-A
- 3. Outer harbor
- 4. Inner harbor
- 5. 30-300 kg foundation mound
- 6. Restored cross section (B-B)
- 7. 2t hollow triangular blocks
- 8. Superstructure
- 9. Cross section prior to damage (C-C)
- 10. Restored cross section (C-C)

With a law to a sea war property

402 E 19 13985 W

西京 计 图

M W R THERESE THE

自然性能发生。1982年的特殊的1982年至1980年,1980年中华长年1980年,1980

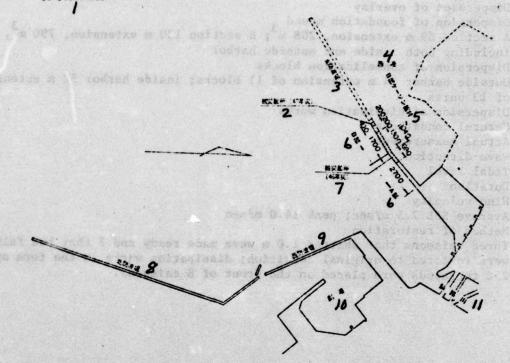
| 災 九 13 直 立 | (B部) 2 | | 基礎特石が採品し据え付か 動しそれに伴い根間プロ // B H L 10×6.0×13.0 例 | が完成していた8輌 ック11億が静動し | の.5 5先衛 2 両が | | | | | | |
|----------------------|---|---|---|---|--|--|--|--|--|--|--|
| 允 /3 直 立 | (B部) 2 (| 6 0 mを然正中。 的転落。3 悉が移 | 基礎特石が採品し据え付か 動しそれに伴い根間プロ // B H L 10×6.0×13.0 例 | ック11億が滑動し | | | | | | | |
| 立部 | 7-14 | す 15 性 | | 20.4 経際0.2 個 | | | | | | | |
| 部 | 7-14 | コンクリート | | | | | | | | | |
| 部 | | | セメント使用量 300 | kg/m² 18 | BONG DESIGNATION | | | | | | |
| | | 政 19 15 | 55kg/m³ SD35 | | | | | | | | |
| | | 中 20 結 | 砂 2/ 単位体標度級 20 七/㎡ | | | | | | | | |
| | 上部場所科子シクリート | | 未起工 23 | | | | | | | | |
| 12 - | 25 6 | | /ta26 | | | | | | | | |
| 1 | \$ 37 L | | | | | | | | | | |
| | | 36. | 野内とも 2.5×1.0×4.0 | | | | | | | | |
| 即上 | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 95 8 H Ft N | | | | | - | | | | | | |
| | | | | | A部月=30° B部月=19 | | | | | | |
| 43 | •• | 777 | | 45 | | | | | | | |
| | | | | | | | | | | | |
| 爽 - | COMP OF STREET | | 14321 49 | | | | | | | | |
| | 45 | | | | | | | | | | |
| | 5 | | | | | | | | | | |
| 2 | .53 | | 能外, 延長24m, 11 | 個 链内,延長 5 | 2m. 13M 53 | | | | | | |
| | | | - | | | | | | | | |
| | | | - 56 | | Γ. | | | | | | |
| 数 自然条件 改 | | | | | | | | | | | |
| | | | | | 24.00000 | | | | | | |
| | - D | 和7年 間 | 7.0 h | 图 60 连 | 於阳最大 N 1 4.0m/m | | | | | | |
| | 部 利 教 教 教 教 教 教 教 教 教 教 教 教 教 教 教 教 教 教 | 部 稍度3/0-10 / 10 / 10 / 10 / 10 / 10 / 10 / 10 | 部 稍被30.70 在 L32 附 被 | 部 稍度分 2 な L32 # 2 0 他 な L32 # 2 0 他 な L32 # 35 | 部 前肢 30 m 1 32 m 1 35 m 1 37 E 2 35 m 2 36 m 1 1 0 0 sec | | | | | | |

- 1. Regional facility name
- 2. West harbor east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 11-13 Sept. 1971
- 9. Typhoon No. 26
- 10. Damage status
- 11. (A part): 257 m of foundation mound being constructed was broken apart. (B part): 260 m under construction had the foundation mound dispersed, and of the 8 caissons placed and completed the cusp of 2 shifted and fell, 3 shifted and with this, 11 consolidation blocks slipped and moved.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4 compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Cement used 300 kg/m³
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight 20t/m³
- 22. Upper concreting in site
- 23. Not done
- 24. Riprap
- 25. Foundation mound
- 26. Per piece
- 27. Overlay
- 28. Not done
- 29. Consolidation blocks
- 30. Both inside and outside harbor
- 31. Precast concrete armor units
- 32. None
- 33. Dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. Section
- 42. At time of damage
- 43. Amount of damage
- 44. Levee body slide
- 45. 3 caissons 1.0 m, 2 fell

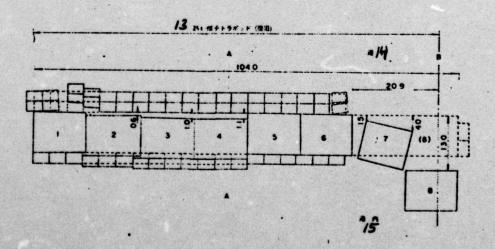
- 46. Levee body slope
- 47. 2 caissons
- 48. Condition of levee body damage
- 49. Dispersion of overlay
- 50. Dispersion of foundation mound 3.
 51. A section 69 m extension, 208 m³; B section 130 m extension, 790 m³, including both inside and outside harbor
- 52. Dispersion of consciidation blocks
- 53. Outside harbor 24 m extension of 11 blocks; inside harbor 52 m extension of 13 units
- 54. Dispersion of dissipation works
- 55. Natural conditions
- 56. Actual measurement
- 57. Wave direction
- 58. Tidal level
- 59. Duration
- 60. Wind velocity
- 61. Average SSE 7.5 m/sec; peak 14.0 m/sec
- 62. Method of restoration
- 63. Three caissons that shifted 1.0 m were made ready and 2 that had fallen were restored to original condition; dissipation works in the form of 25t tetrapods were placed on the front of 8 caissons.

spread your sevel de doll'hes

被災施設位置的

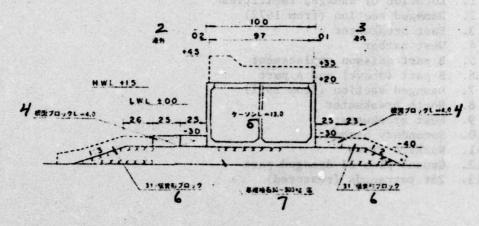


枝災的所平面図 12

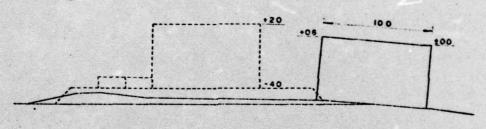


- Location of damaged facilities
- Damaged section (from 1972) 2.
- 3. East breakwater
- West harbor
- 5. B part caisson emplacement
- 6. B part (above) and A part
- 7. Damaged section (from 1971)
- 8. North breakwater
- 9. West breakwater
- 10. Secondary harbor
- 11. Kushiro river 12. Ground plan of damaged part
- 13. 25t tetrapods (restored)

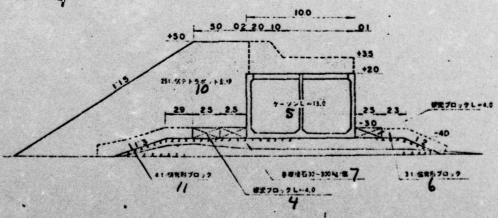
被災前断面図(A-A)



被災時新面間(A-A)



税旧断面図(A-A)



1. Cross section prior to damage

- 2. Outer harbor
- 3. Inner harbor
- 4. Consolidation blocks
- 5. Caisson
- 6. 3t irregular blocks
- 7. 30-300 kg foundation mound
- 8. Cross section at time of damage

Children Gathers was the contract of the property of the contract of the

所在3.00 年 12. 网

- 9. Restored cross section
- 10. 25t tetrapod random rubble
- 11. 4t irregular blocks

a paragraph of a world have an low to propose a company

% 9%.

Pin.

| 完成年 | 年月日 | GM: | T # | | | 被炎年月日 | 8日和 4 7年 | 2月1 | 4 8 | | 9(低気压 |) |
|------|----------|-----------------|-------------|--|---------------------|---------------------------|---------------|--------|-----------|-----|------------------------------|-----|
| 数/状/ | 0 规 | 1 × 3 × 1 | ソン2は | が移動し | . 46 | 年9月に移動 | 転落したケー | ソンを | 引起夜 | 旧中 | の 2 繭の 5 ち 1 前 | id: |
| | 13 | | | 寸 15 法 13.0×60×10.0 侧壁0.4 隔壁0.2 底盤0.5 /6 | | | | | | | | |
| | | 1 4 5 | 14, | 3767 | y - r | セメント使用量 300k8/㎡ 18 | | | | | | |
| 12- | 郊 | | | 政 14 | 鉄 19 坊 55kg/m² SD35 | | | | | | | 755 |
| 12 数 | | | | # 20 | 能 | ₩ | 2/ | 46 | 244M | R G | 2.0 1/1 | |
| | | 上部 | 場所行 | ンクリ・ | - + | 未然I 23 | 3 | i | | | | |
| | 24 | 器 6 | 25 石 | 30~3 | 0 0 kg | /68 26 | | | | | | |
| 災 | 检 | 枝花 | | 未施工 | 28 | + 2 | | i | 1 | | | |
| | 5 | | 38,, | 能外的 | ٤٤ ۽ | B H 1. 2.5 × 1.0 × 4.0 | | | 1 | | | |
| | 都 | 消费 | 消費プラック なし32 | | | | | | | | | |
| 前 | | m #33 | | ts 132 | | | | | | | | |
| | 34+ | その他 | | t L32 | | | | | | | | |
| | | 25 12 H TI H | | ti 3 | 5 75 | H 1/3 = 5 | . 0 m | 枚 | 37 | Æ | 奇 改 39 | |
| | | ar 3 | | R 34 | | 1 5.0 sec | | 14 | D4 | * | B=19° | |
| | 42 | | | 43 + ~ b 2 2 1.0 m | | | | | | | | |
| | 被 | 立部 24 指 石 都 | 堤体 | 48 1 | 4 | ts L'32 | | | | | | |
| 41 | 爽 | | 旋体 | 数据 0 | 状况 | 1歳(前回 | 滑勁し役旧作 | 英中の | 60) | 47 | | |
| | 1 | | 被权 | 100 | 数 私 | - 1. | | | | | | |
| | tk Æ | | * 65 | 岩.0 | 敗 乱 | 46年9月 | の被災分を復 | 日してい | ・ない | 201 | 波災はあるが数量 | 不明 |
| 英 | | | 根拠プ | \$1,00 | 散乱 | 差外, 延長 | 24m. 126 | 港 | 内. 延 | 長2 | m. 6# 52 | |
| | | | 消费 | 130 | 数 乱 | | | | | | | |
| | | 34 + 0 M | | | | | | | | | | |
| B | | 54 技 自然条件 技 | | 36 | * | H 1/3 = 5 | .8 m (美嗣) | M | 39 | M | 1 5.0 sec | |
| | 自然 | | | 56 | A | N170° | | | 57 | * | +0.49 m | |
| | | RE | | | ff) | 20h | | - | 59 | * | 平均 ESE 19.6m 時間数大 ESE27.8 | |
| a. | 61 7 | t. | 移動 | | y > 2 j | 角は出来形とし | - 根配方規と 62 | DMIC S | 0~: | 000 | ks/他の割石を | |

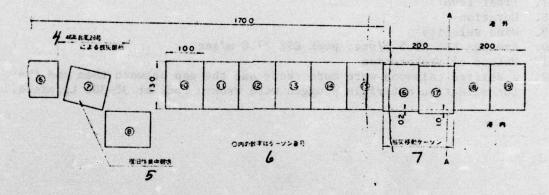
- 1. Regional facility name
- 2. West harbor east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. In construction
- 7. Date damaged
- 8. 14 Feb. 1972
- 9. Low pressure
- 10. Damage status
- 11. Two of the caissons shifted; one of 2 being restored after shifting and settling in Sept. 1971 was destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Cement used 300 kg/m³
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight 20t/m³
- 22. Upper concreting in site
- 23. Not done
- 24. Riprap part
- 25. Foundation mound
- 26. Per price
- 27. Overlay
- 28. Not done
- 29. Consolidation blocks
- 30. Both inside and outside harbor
- 31. Wave dissipation works
- 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide
- 44. Levee body slope
- 45. 2 units

- 46. Condition of levee body damage
- 47. 1 unit (one that slipped forward during restoration)
- 48. Dispersion of overlay
- 49. Dispersion of foundation mound
- 50. Some damage but amount unknown since the part damaged in Sept. 1971 was not being restored
- 51. Dispersion of consolidation blocks
- 52. 24 m extension of 12 blocks outside harbor; 24 m extension of 6 inside harbor
- 53. Dispersion of dissipation works
- 54. Natural conditions
- 55. Actually measured
- 56. Wave direction
- 57. Tidal level
- 58. Duration
- 59. Wind velocity
- 60. Average ESE 19.5 m/sec; peak ESE 27.8 m/sec
- 61. Method of restoration
- 62. 2 shifted caissons were made ready and the gap between them and the consolidation materials plugged with broken rock at 30-300 kg/piece.

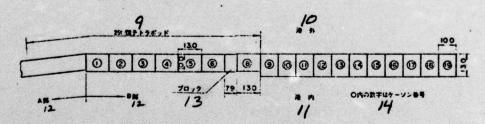
被災極数位置図

26 釧路西港東防波堤参照

被災為所平面內 3

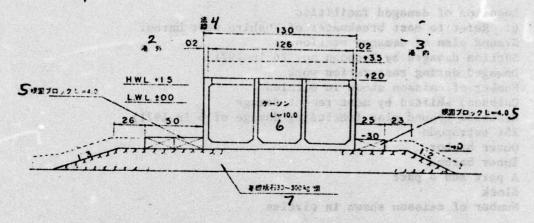


復旧平面図(⑥の46年災も含む)

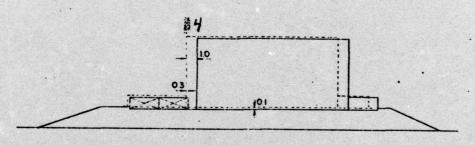


- 1. Location of damaged facilities
- 2. 6. Refer to east breakwater of Kushiro west harbor
- 3. Ground plan of damaged section
- 4. Section damaged by Typhoon no. 26 in 1971
- 5. Damaged during restoration work
- 6. Number of caisson shown in circles
- 7. Caissons shifted by most recent damage
- 8. Restored ground plan (including damage of 6 in 1971)
- 9. 25t tetrapods
- 10. Outer harbor
- 11. Inner harbor
- 12. A part and B part
- 13. Block
- 14. Number of caisson shown in circles

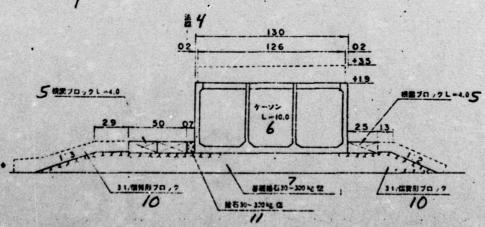
被災前折面図(A-A)



被災時所而図(A-A)



復用新面図(A -A)



Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Normal
- 5. Consolidation blocks
- 6. Caisson
- 7. 30-300 kg foundation mound
- 8. Cross section A-A at time of damage
- 9. Restored cross section A-A
- 10. 3t irregular blocks
- 11. 30-300 kg riprap

AND PARKET AND AND A PARKET AND A CONTRACT OF A SAME AND A SAME AN

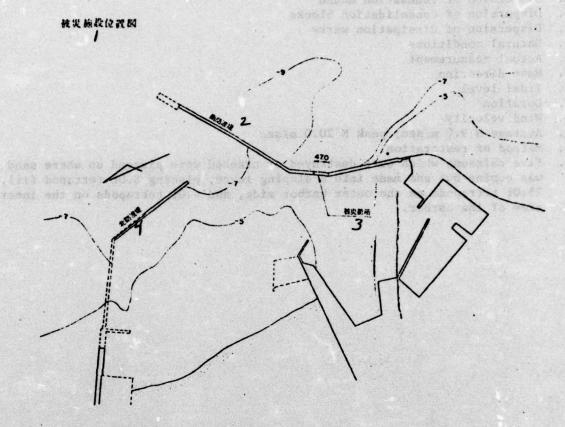
| /地 | 区施 | ·, | 2前即 | · 使 | BMA | 株式 4ケーソン | ·式程成级 . | | | |
|----------|-------|-----------|--------|-----------------------------|---|---------------------------------|-----------------------------------|--|--|--|
| 完成年月日 | | 6昭和37年 | | | 7被災年月日 8四和 4 7年 2 月 2 8 日 9 (低级压) | | | | | |
| 被状 | の元 | | | | 外機機が破壊くずれ落ち。3 が破壊転落し、機外内に砂か // | A THE RESIDENCE OF THE PARTY OF | 亀装が生じ中結が | | | |
| | /3 | ,,, | | 寸 15 株コンパート | B H L 例5 | | 3 底盤 0.5 /6 | | | |
| | 立 | 7- | 14 | 致 19 粉 | | | | | | |
| 12 | 都 | | | th 20 th | ₹D 2/ | 単位体積重量 | 2.0 t/m² | | | |
| | | 上部場所打二 | | | セメント使用量 270kg/ | | in day day in Stolings 20 - C | | | |
| | 24 | | | 30~300kg | 8/例(平均 60kg/個)26 | | | | | |
| 災 | 捨 | 被 犯 工 | | 趣外内とも 2.01/顔テトラポッド28 | | | | | | |
| | E | | 31,, | ts 130 | | 1 / | | | | |
| | 部 | 消放多4.0 1 | | * L30 | | | | | | |
| 育 | | 的首 | 22 A A | | | | | | | |
| | 33+ | 0 | 他 | 12 L 30 | | | | | | |
| | 1 22 | 34 | į #i | 故 35 高 | H 1/3 = 3.8 m | 枝 36 旺 | | | | |
| | | | | 周 38 期 42 | 1 0.0 sec | 入39射 角 | β=0° | | | |
| | 41 | 超 堤体 | | 42 43 版 新 な L30 | | | | | | |
| 40 被 | 被 | 部 24 拾 | 提体 | で領料 | ケーソン2 鍼破線, 3 盛れ | -4-3 + 8:50 III | _ | | | |
| 被 | 災 | | | 160 收乱 | tz 130 | - VE THE A | | | | |
| | 数 | | | 470 数 乱 | te 130 | | | | | |
| 炎 | 1 | 石 | 石棚田子 | 48,00散乱 | | | | | | |
| ^ | | 部 | | INO N BL | _ | | | | | |
| | | 33 | | e 10 | | | | | | |
| R'y | | | 被 | 35 K | H 1/3 = 4.8 m (美剛) | N 38 M | 1 1.4 sec | | | |
| | | SD 自然条件 按 | | 52 向 | SSE | # 53 tt | | | | |
| | | | 鞋 | #54h NI | 10h . | 服 55 速 | 平均 N 9.0 m/sec 56 時間最大 N 20.0 m/s | | | |
| U | 57 旧方 | | | | たケーソン 5 統は砂の上に出 1 / 間、機内側を 4.0 t / 側の 58 | | | | | |

8. Tokachi Harbor

- 1. Regional facility name
- 2. South breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1962
- 7. Date damaged
- 8. 28 Feb. 1972
- 9. Low pressure
- 10. Damage status
- 11. Two of 5 caissons fell, the outer harbor walls breaking up; 3 developed large cracks in the walls and the fill flowed out. The superstructure of all fell away and sand accumulated inside and outside the harbor.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.45, compartment wall 0.3, base plate 0.5
- 17. Concrete
- 18. Cement used 320 kg/m³
- 19. Reinforcing steel
- 20. F111
- 21. Sand. Unit volume weight 20t/m3
- 22. Upper concreting in site
- 23. Amount of cement used 270 13/cm3
- 24. Riprap part
- 25. Foundation mound
- 26. 30-300 kg/piece (average 60 kg)
- 27. Overlay
- 28. 20t tetrapods inside and outside the harbor
- 29. Consolidation blocks
- 30. Non?
- 31. Precast concrete armor units
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. Levee body slope
- 44. Condition of levee body damage
- 45. Two caissons destroyed, large cracks in 3

- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. Dispersion of dissipation works
- 50. Natural conditions
- 51. Actual measurement
- 52. Wave direction
- 53. Tidal level
- 54. Duration
- 55. Wind velocity
- 56. Average N 9.0 m/sec; peak N 20.0 m/sec
- 57. Method of restoration
- 58. Five caissons which were destroyed or cracked were plugged up where sand was coming out and made into a sloping levee, placing 8.0t tetrapod fill, 25.0t tetrapods on the outer harbor side, and 4.0t tetrapods on the inner side of the harbor.

被災施数位置器



被災箇所平面的 5



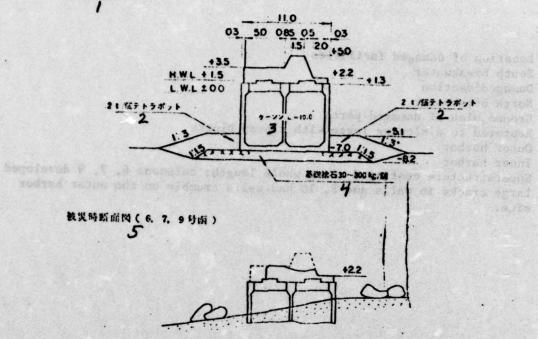
8. Tokachi Harbor

Key:

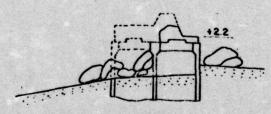
- 1. Location of damaged facilities
- 2. South breakwater
- 3. Damaged section
- 4. North breakwater
- 5. Ground plan of damaged parts
- 6. Restored to a sloping levee with riprap blocks
- 7. Outer harbor
- 8. Inner harbor
- Superstructure destroyed along whole length; caissons 6, 7, 9 developed large cracks in walls and 8, 10 had walls crumble on the outer harbor side.

在"自然"的"自然"中,在"自然"的"是

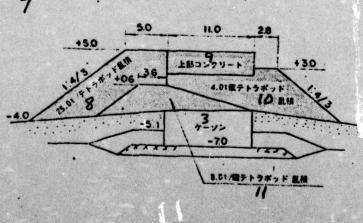
被災前所而內



被災時断面関(8.10号兩)



復旧新雨図(6~10号函部分)



8. Tokachi Harbor

提為於者以 非成為因 如人

Key:

- Cross section prior to damage
- 2t tetrapods
- Caisson
- 30-300 kg foundation mound
- Cross section (nos. 6, 7, 9) at time of damage Cross section (nos. 8, 10) at time of damage Restored cross section (parts of 6-10)
- 8. 25.0t tetrapod random rubble
- Upper section concrete
- 10. 4.0t tetrapod random rubble
- 11. 8.0t tetrapod random rubble

器 探察

20 what zones

OA CHAMBATATATA

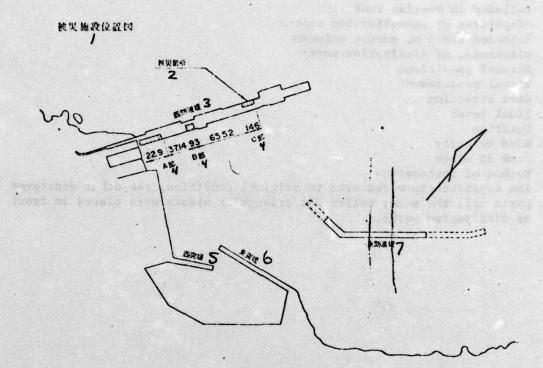
BERTHANDS OF BARY THEE STEEL BERTHANDS WEST CONTROL OF THE

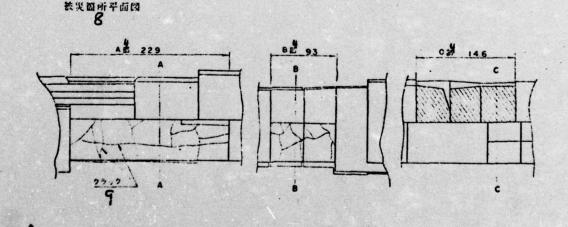
9 省 形 港

| | | | 211 | 的夜堤 | | 様式・4ケーソン | | | | |
|-------|-------------|--|----------------|--|-----------------------------------|------------|--|--|--|--|
| 完成年月日 | | 6昭和37年 | | | 7被災年月日 5四和 4 1年 10月 28~30日 9(低级胚) | | | | | |
| 被状 | 10 元 | 被問 | (T*1 0 | 根間ブロック制 | は乱しケーソンが移動,上部] // | こが破壊した。 | ebegarana a ebegarana a noensa benel ga UGC-3 | | | |
| | 13 | | | 寸 15 法 不明, 法線直角方向に 2級並べてあり寸法も様々 | | | | | | |
| | | 1 | 14 | 2218-1 | 不明/8 | 1 mil 1540 | manjo horskin | | | |
| 12 | 立 | | | 鉄 19 粉 | 不 明/8 | 9397 THE | | | | |
| 被 | 85 | | | 中 20 結 | 不明/8 | 単位体積監督 | 不明 | | | |
| | | Action to the | | ンクリート | 不明/8 | | | | | |
| | 23 | 被 截 工 能外内とも格 | | 30~100kg/1925 | | | | | | |
| 災 | fa | | | | 行30~100kg/健27 | | | | | |
| | 石 | | 28,7 | 是外 B 2.0×2 | 1 L .0×2.5 | | | | | |
| | 都 | The second | 稍放光,1 な L31 | | | | | | | |
| 前 | | 荫 成 清 石 | | 12 131 | | | | | | |
| | 33+ | 0 1 | | tr L3/ | | | | | | |
| | R | 34 H 3 | # | 枝 35 高 | | 被 36 E | 不明18 | | | |
| | - | 1/31 | | 別 37 期 別 ナベり | 不明8 | YAN W | 不明18 | | | |
| | 40 | The state of the s | | the state of the s | | | | | | |
| 39 | 被 | 23 | | 46 版 科 教 教 教 | ts 131 | - 1111 | | | | |
| 被 | 炎 | | | | 上部コンクリート 46.8 巻外、延長176.3m 数数 | | te L 46 | | | |
| | 数 | | 基度 | | | RATE TENS | 45 de | | | |
| | 1. | 石 | | 一种20数乱 | | | | | | |
| 炎. | 2 | 部 | | 156 M A | 4 | | | | | |
| | | | | | | | | | | |
| 84 | | | , E | 35 % | H 1/3 = 6.4 m (日初) | N 37 N | 9.0 sec | | | |
| | 自然 | 52 自然条件 使 | | 54 m | NW | m 55 tz | | | | |
| | | | The same of | 655645 FIJ | 本明/8 | 風 57 速 | | | | |
| 復 | 59 IB 75 | 佐 | | Lを原形に復旧 ックにて前放工 | L その他の被災部分はそのま | まにして前面に | 2 5 t/個中至三角 | | | |

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1962
- 7. Date damaged
- 8. 28-30 Oct. 1966
- 9. Low pressure
- 10. Damage status
- 11. The overlay rock and consolidation blocks dispersed; caissons were shifted and superstructure destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Unknown; 2 arranged at right angles to the normal had the same dimensions.
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Unit volume weight unknown
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Per piece
- 26. Overlay
- 27. Riprap 30-100 kg/piece both inside and outside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Precast concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Period
- 38. Angle of incidence
 - 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. Concrete on upper part 46.8 m
- 45. Dispersion of overlay

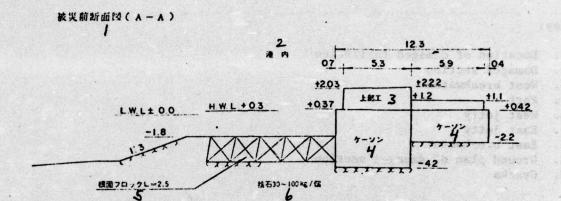
- 46. 176.3 m extension, amount unknown, outside harbor; inside harbor, none
- 47. Dispersion of foundation mound
- 48. Included in overlay rock
- 49. Dispersion of consolidation blocks
- 50. Extended 176.3 m, amount unknown
- 51. Dispersion of dissipation works
- 52. Natural conditions
- 53. Visual measurement
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Wind velocity
- 58. Peak 35 m/sec
- 59. Method of restoration
- 60. The superstructure restored to original condition, the other destroyed parts left the same; hollow 25t triangular blocks were placed in front as dissipation works.

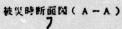


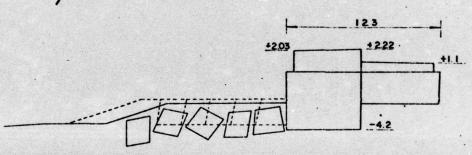


- 1. Location of damaged facilities
- 2. Damaged section
- 3. West breakwater
- 4. Part
- 5. West jetty

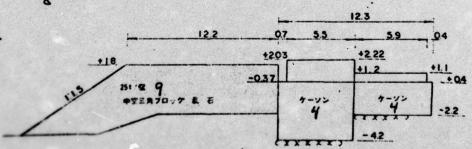
- 6. East jetty
 7. East breakwater
 8. Ground plan of damaged section
 9. Cracks





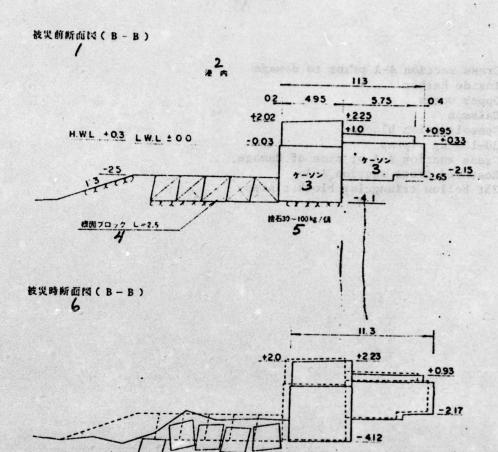


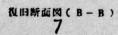
復旧断面図(A-A)

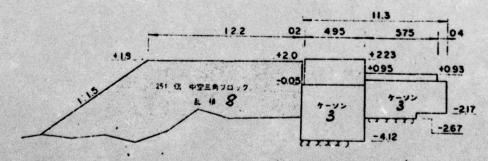


- 1. Cross section A-A prior to damage
- 2. Inside harbor
- 3. Upper works
- 4. Caisson

- 5. Consolidation blocks
 6. 30-100 kg riprap
 7. Cross section A-A at time of damage
 8. Restored cross section A-A
 9. 25t hollow triangular block riprap

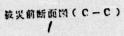


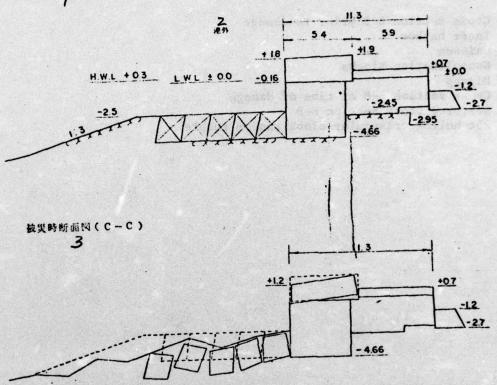




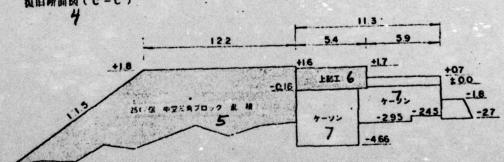
- 1. Cross section B-B prior to damage
- 2. Inner harbor
- 3. Caisson
- 4. Consolidation blocks
- 5. Riprap

- 6. Cross section B-B at time of damage
 7. Restored cross section B-B
 8. 25t hollow triangular block random rubble





地田斯斯斯 (C-C)



Key:

- 1. Cross section C-C prior to damage
- 2. Outer harbor
- 3. Cross section C-C at time of damage
- 4. Restored cross section C-C
- 5. 25t hollow triangular block random rubble
- 6. Superstructure
- 7. Caisson

The Design of the contract of

STATE AT MAN WAR A WAR STATE OF THE STATE OF

1- DX ----

meria a mi famoremonal a

STEELEN TEELE TEELE EN FRANCE OF THE LEVEL WAS THE

SHAIN EX 19

经现场上级 有数 28

⑩ 沓 形 卷

| 地 | 区施 | 設 名 | 2西 5 | 放堤 | 3株造行式 4ケーソン式提成堤 | | | | | |
|--------------|-------------------|---|--------------|----------------------|---|---------------------|----------------|-----------------|------------|--|
| 完成年月日 6昭和37年 | | | | | 7被災年月日 3個和 4 4年 2 月 6 日 9 (低気圧) | | | | | |
| 被人状 | 0 克 | 100000000000000000000000000000000000000 | 拾石およ 部工が続 | | してれに伴い根例ブロックが | ・化下飲品した | · 227- | ソンが移 | B i | |
| | 13 | | | す 15 性 | B H L N N N N N N N N N N N N N N N N N N | 0.4 簡繁 0.2 | 5 麻絵 0 4 | 16 | | |
| | 立 | 7- | 7,2 | # 19 B | 3 8.9 kg/m² | | | | _ | |
| 12 | 部 | | | ф 20 B | 港外1室コンクリート, 残 | 2室砂2 单位 | 2体核重量 | ₩ 2.0 t, | /m? | |
| | | 上部場所打コンクリート | | ンクリート | 不明/8 | | | | | |
| | 23 | X e | 指石 | 30~100kg | /億25 | | | | | |
| 災 | 檢 | | | | 石 30~100kg/個27 | | | | | |
| | 石 | | 38,, | 卷列 B 3.0×1 | H L B 2.0 × 1 | H L 2.0 × 2.0 | | | | |
| | 都 | | 70,1 | te L32 | | | | | | |
| 柯 | | | 6 6 | t L32 | | arterior projection | | | | |
| | 34+ | 100 | | te 132 | | 1 | | | | |
| | 100 | 数計資料 被 | | | | | 臣 碎 被 | | | |
| , | | | | 周 39 期 | | 入40时 | $\beta = 0$ | • | _ | |
| | 42 | _ | | 43+ ペ り 5両. 版大0.5m44 | | | | | | |
| ш | 被 | 部 | 提 体 | | * L32 | | | | | |
| 纵被 | 炎 | | 提件 | | 上部コンクリート1部破場 港外、延長66.6m 数量を | | - (((+ n = EF | T #/- \$1. 1. 3 | 780 | |
| | | 23 | 数级 | | 被極石に含めたら | ry er, e | 火のツ、座下 | × 50. 50. 5 6 | 7.7 | |
| | 2 | 都根 | | 52,0 ma | 港外, 延長 66.6m 数量不 | 田 新内 林 | Wan TER | 2000 | 不叫 | |
| 災 | | | | 140 K & | | | | | | |
| | | | | O . Mb | | | | | | |
| P | | | 被 | 86 × | H 1/3 = 5.7 m (推定) | m 39 | 月 1 2 900 | | | |
| | | 55 | | 57 m | 不明/8 | m 58 | 位不明 | 18 | | |
| | | | * | 粉59時 間 | 不明18 | M 60 | 速不明 | | | |
| ta | 6 / 旧 方 | 佉 | | | しその他の被災部分はそのま ックにて消波工を設けた。 62 | またして、前 | 新および先が | 端部 七3(| | |

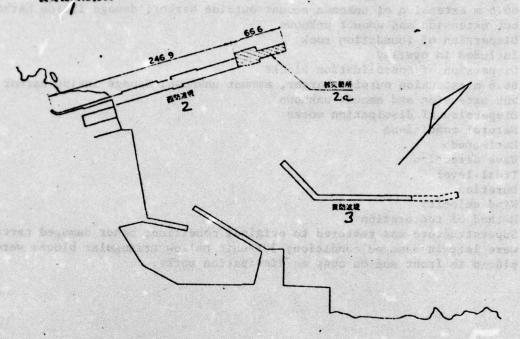
- 1. Regional facility name
- West breakwater
- Construction method
- Caisson composite breakwater
- 5. Date completed
- 6. 1962
- 7. Date damaged
- 8. 6 Feb. 1969
- 9. Low pressure
- 10. Damage status
- 11. Foundation riprap and overlay rocks dispersed and with this the consolidation blocks settled and dispersed. The caissons shifted and superstructure was destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.25, base plate 0.4
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Outer harbor chamber with concrete, remaining 2 with sand. Unit volume weight of sand 20t/m3.
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Per piece
- 26. Overlay
- 27. Riprap 30-100 kg/piece inside and outside the harbor
- Consolidation blocks 28.
- 29. Outer harbor
- 30. Inner harbor
- 31. Wave dissipation blocks
- 32. None
- 33. Precast concrete armor units
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide 44. 5 caissons, maxim 5 caissons, maximum 0.5 m
- 45. Levee body slope

- 46. Condition of levee body damage
- 47. One part of upper concrete destroyed
- 48. Dispersion of overlay
- 49. 66.6 m extension of unknown amount outside harbor; damage inside harbor but extension and amount unknown
- 50. Dispersion of foundation rock
- 51. Included in overlay
- 52. Dispersion of consolidation blocks
- 53. 66.6 m extension outside harbor, amount unknown; damage inside harbor but extension and amount unknown
- 54. Dispersion of dissipation works
- 55. Natural conditions
- 56. Estimated
- 57. Wave direction
- 58. Tidal level
- 59. Duration
- 60. Wind velocity
- 61. Method of restoration
- 62. Superstructure was restored to original condition; other damaged parts were left in damaged condition; 30t/unit hollow triangular blocks were placed in front and on cusp as dissipation works.

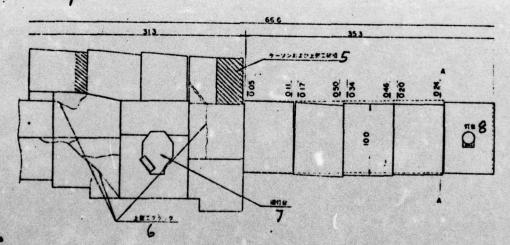
squeet when specific to of the bureau to area are

College Crave And authorized

数災施災位置四

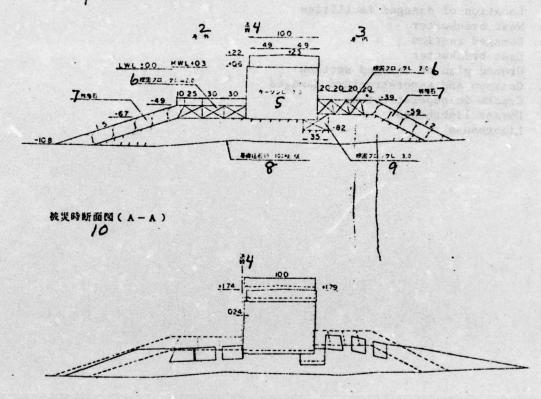


被災箇所平面図 4

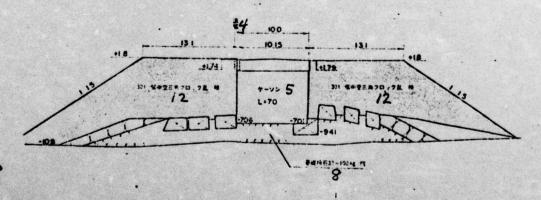


- 1. Location of damaged facilities
- 2. West breakwater
- 2a. Damaged section
- 3. East breakwater
- 4. Ground plan of damaged section
 5. Caisson and superstructure damaged
 6. Cracks in superstructure
 7. Former lighthouse
 8. Lighthouse

被災前断面図(A-A)



後旧断面図(A - A) //



Key:

- Cross section A-A prior to damage
- Outside harbor
- Inside harbor
- Normal
- Caisson
- Consolidation blocks
- Overlay .
- 8. 30-100 kg foundation mound
- Consolidation blocks
- Cross section A-A at time of damage
- Restored cross section A-A

NAME OF THE STATE OF

Education Carried to No. 18

12. 30t hollow triangular block random rubble

22 1 25

Family acama Pas

· 1985年 1987年 198 ANDAR AND AND THE SPECIAL PROPERTY OF THE PROPERTY OF THE PARTY OF THE

| | | | | 防放堤 | L | B楊遊存式 4% | | | | |
|------|------|----------|------------|--|------------------------------------|--------------------|-------|---------------------|--|--|
| 250年 | 月日 | | | | L | | | 日 9 低级胜) | | |
| 被状 | 10 克 | 被似した。 | | ドッドが飲乱。 | ケーソンが移動しとも | に作い基礎指石 | および | 根菌プロックが散乱 - ・ | | |
| | 13 | | | 寸 15 株 | B H L 8.0×8.0×10.0 セメント使用量 3 | | 0.25 | 武台 0.5 16 | | |
| | 立 | 7- | 17, | 获 19 B | 2 5.8kg/m² | 1 0 %/ W | | | | |
| /2 | 部 | | | 中 20 結 | 砂, 雜割石 2/ | 单位体 | 计五段 | 不明 | | |
| | | 上部 | 上部場所打コンクリー | | セメント使用量 2 | 70kg/m² 23 | ni es | neg jarojask | | |
| 災 | 24 推 | | 元 石 元 五 | | 個 26 | | | | | |
| | 75 | | 39,, | 港內, 2.5×1.5×3.0 | | | | | | |
| | 部 | 稍被34。 | | ts 1 32 | | | | | | |
| 前 | | 稍战 | 33 石 | | | | | | | |
| | 34+ | その他 なし32 | | | | | | | | |
| | 10 | 25 pt | 14 | 数 36 高 | H 1/3 = 4.0 m | 改 3 | | | | |
| | | | | 周 39 期 | 1 1.0 sec | 1409 | 角 | β = 3 0° | | |
| | 42 | 0.3 | | 71E | | | | | | |
| 41 | 被 | 部 24 | | 超级 经 经 经 经 经 经 经 经 经 经 经 经 经 经 经 经 经 经 经 | 最大6°46 | | | | | |
| 41 被 | 災 | | | 480数乱 | 巻外、被災あり、 | 数缺不明 40 | | | | |
| | 数 | 格 | | 500 散乱 | 港外内とも被災あ | | , | | | |
| 災 | 粒 | 石部 | 石 | 52,00散乱 | 港内. 延長 3.5 m, | 內. 延長3.5 m, 27個 53 | | | | |
| | | | 消被 | 至40股乱 | | | | | | |
| | | 34 | ł | 0 他 | | | | | | |
| 飾 | 5 | 5 | 故 | 36 B | 不明56 | 周 5, | 7 M | 不明5% | | |
| | 自然 | | 故 | 58 M | 不明56 | M 5 | 9 12 | +0.5 m | | |
| | 1 | | 糖 | 粉60時 間 | 不明56 | 風 6 | / 進 | 跨間於大SW25.2m/s | | |

AD-A036 006

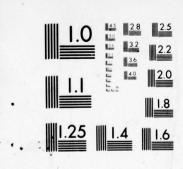
PORT AND HARBOUR RESEARCH INST TORYO (JAPAN)
DISASTERS OF BREAKWATERS BY JIVE ACTION (2).(U)
MAR 75 H TAKEYAMA, T NAHAYA.AA

ACSI-K6472

NL

ROSSECTED

20F AD AD 36006



MICROCOPY RESOLUTION TEST CHART NATIONAL BUREAU OF STANDARDS-1963

11. Teuri Harbor

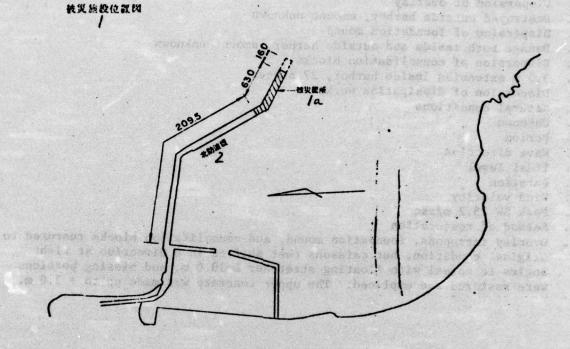
- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 22 Nov. 1965
- 7. Date damaged
- 8. 16-17 Dec. 1965
- 9. Low pressure
- 10. Damage status
- 11. Overlay tetrapods dispersed and caissons shifted, resulting in dispersion of foundation mound and consolidation blocks.
- 12. Prior to damage
- 13. Vertical part
- 14. Caisson
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.25, base plate 0.5
- 17. Concrete
- 18. Cement used 310 kg/m³
- 19. Reinforcing steel
- 20. Fill
- 21. Sand, miscellaneous broken rock. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Cement used 270 kg/m³
- 24. Riprap part
- 25. Foundation mound
- 26. Per piece
- 27. Overlay
- 28. Outside harbor 20t tetrapods
- 29. Consolidation blocks
- 30. Inside harbor
- 31. Wave dissipation works
 - 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide
- 44. 6 caissons, maximum 5.4 m
- 45. Levee body slope

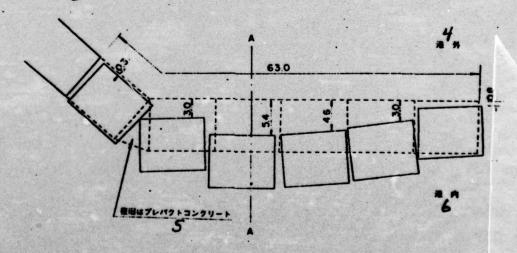
- 46. Maximum 6°
- 47. Condition of levee body damage
- 48. Dispersion of overlay
- 49. Destroyed outside harbor, amount unknown
- 50. Dispersion of foundation mound
- 51. Damage both inside and outside harbor, amount unknown
- 52. Dispersion of consolidation blocks
- 53. 3.5 m extension inside harbor, 27 pieces
- 54. Dispersion of dissipation works
- 55. Natural conditions
- 56. Unknown
- 57. Period
- 58. Wave direction
- 59. Tidal level
- 60. Duration
- 61. Wind velocity
- 62. Peak SW 25.2 m/sec
- 63. Method of restoration
- 64. Overlay tetrapods, foundation mound, and consolidation blocks restored to original condition, but caissons that shifted in a direction at right angles to normal with floating stretcher L=10.0 m, and missing portions were restored and emplaced. The upper concrete was made up to + 3.0 m.

agetab gling serves in meanless.

values to reference

被災施設位置因





11. Teuri Harbor

てルチョン活血機能量は

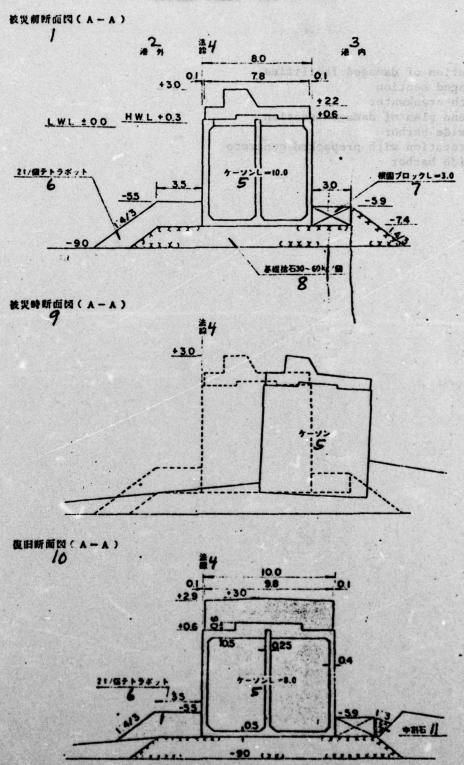
《本一本》如油物物质

Key:

- 1. Location of damaged facilities
- la. Damaged section
- 2. North breakwater
- 3. Ground plan of damaged section
- 4. Outside harbor
- 5. Restoration with prepacked concrete

401

6. Inside harbor



11. Teuri Harbor

PROBLEM EN PL

| 1. 2. 3. 4. 5. | Outer harbor Inner harbor Normal Caisson | | | | | |
|----------------------------|--|--|--|------------------|-------------------------|----------------------|
| 6. 7. 8. 9. | Consolidation 30-60 kg four Cross section | n blocks ndation moun n A-A at time | nd ne of damage | | . M. | 1 % |
| 10. 11. | Restored cros | | 1-A | 1 de 4 | | |
| | | \$33 | (1) 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 1-15 4 - | | |
| | | | 420 | glabalent | | |
| | | A STATE OF THE STA | \$29.00 | | | |
| | | | A STATE OF THE STA | te a significant | 0.049 | 1 0 |
| | - Page 10, 100 lg ding page | | | | a - 14 a | |
| | and the second of the second of the | | | 45 3 4 | | |
| | | | | -46 | | |
| | \$1.4.4 | 18 VR 3 | MED AND B | 2 4. 3 | | |
| | To A | [集] [[] | the second secon | 建一张 位 | يوني والمصدول | |
| | e and response a subsequent | Comment of the second s | May to the second second | | | |
| | | | | | | |
| | er Samuel and Samuel Company of the Samuel S | | By were the Englishment | | | |
| | | experience and the second property of | | | | |
| | and the second second | 4.6 | ACTOR STORMS OF | | | |
| | | production of the second | | | WAT TO THE TANK THE | |
| | and appropriate the second second second second | The state of the s | | | and Control of the same | |
| | 32.10 % | IN PERT | College and a second | A A | *** | 1 |
| | Control State of Section 1995 | n 14 m | We do to | 00 44 | - | 12 11 (1) (1) (1) |
| 1 | Kongo Kana | le Edal | Olm on | to and a | | |

| 地 | 区施 | 数名 | 2北防 | 放堤 | | 3梯造 | 様式 47 - | " | · |
|-----|----------|------------------|--------------|----------------------|-------------------------|--------------|-------------|------------|--------------------------------|
| 完成年 | 年月日 | 6 83 | 前41年1 | 0月6日 | 7被災年月日 8 | 图和44年2 | 2月5~6日 | | 9(低级压) |
| 被状 | 10 克 | A CASA PROPERTY. | | マッドおよび基礎 S工が一部依頼し | | ケーソンが | 多動した。と | n K | 伴い根間プロックが |
| | 13 | | | 寸 <i>15</i> 株 | B H 9.0 × 7.0 × 1 | | | 3 庭 | 致0.5/6 |
| | 文 | 4 | 14,, | 3217-h | セメント使用 | | 'at 18 | | <u> 20-61, 18-01</u> |
| 12 | | | | 联 19 筋 | 2 5 8 kg/m² | | | | maka kan jada Kasa kanalana |
| 被 | 都 | . 20 | | 中 20 結 | | 21 | 単位体務重 | | 不明 |
| | | 上部 | 場所打= | 30~300kg | セメント使用 | 16 2 7 0 Kg/ | 1 23 | | |
| 獎. | 24 | 被 智 工 根因 24 , 0 | | | / 1626 | 20 | + | | |
| | 5 | | | 海内 B 2.5×1 | | | 11 | | |
| | | | | な し32 | .5 × 3.0 | | -+ | | |
| 韵 | 都 | | 前设备石 なし32 | | | | · | | |
| | 34 + | 0 | 他 | t L32 | | | | | |
| | | 35 | | 故 36 高 | H 1/3 = 3.5 | m ' | 故 37 | Æ | 孙 被38 |
| | R | at 3 | 4 H | 周 39 期 | 8 sec | | 入40射 | 角 | β - 0° |
| 4 | | 温坡林 | | H3 ~ , | べ り 6両, 最大3.9m44 | | | | |
| | 发 | 邮 | 提体 | 45 板 料 | 数大3°46 | | | | |
| 业 | 爽 | | 提体 | 被握の状況 | 上部工,数量 | 不明 48 | | | |
| | | 24 | 被概 | 146 数 乱 | 延長99.3 m. 数量不明 SO | | | | |
| | B | 石 | | 石 | 延长40.0 m. | 数量不明 | 92 | • | |
| 英 | | 邮 | | 153,0数乱 | 被災あり、数量不明 54 | | | | |
| | | | | 150 数 起 | | | | | |
| | - | 34 | | O (k | _ | .57 | T | | |
| * | | 6 | * | 36 A | H 1/3 = 5.0 | m(目例) | 周 39 | Manual Co. | 本明58 |
| | 自然 | 自然条件 技 | | 59 m | 不明60 | | m 61 | | +0.4m 瞬間殺大 30m/m |
| • | | | MA MA | | | Section 1914 | 1 63 | | 段部9 mは 2 5.0 |
| a | 65 方 | 扶 | 1/1 | 第中生三角プロ | ック, その位9(付偶26.0 mは) | 0.3 mt 1 5 | .0 1/每中雪 | EEP | プロックを用いた。 |

12. Yagishiri Harbor

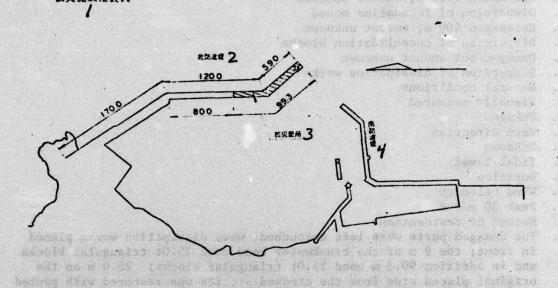
- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 6 Oct. 1966
- 7. Date damaged
- 8. 5-6 Feb. 1969
- 9. Low pressure
- 10. Damage status
- Overlay tetrapods and foundation mound dispersed and caissons were shifted. Consequently consolidation blocks shifted and the superstructure was partially destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.5, compartment wall 0.3, base plate 0.5
- 17. Concrete
- 18. Cement used 310 kg/m³
- 19. Reinforcing steel
- 20. F111
- 21. Gravel. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Cement used 270 kg/m3
- 24. Riprap part
- 25. Foundation mound
- 26. Per piece
- 27. Overlay
- 28. 20t tetrapods outside harbor
- 29. Consolidation blocks
- 30. Inside harbor
- 31. Precast concrete armor units
- 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide
- 44. 6 caissons, maximum 3.9 m
- 45. Levee body slope

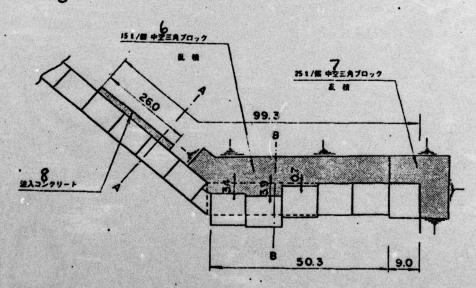
- 46. Maximum 3°
- 47. Condition of levee body damage
- 48. Superstructure, amount unknown
- 49. Dispersion of overlay
- 50. Extension 99.3 m, amount unknown
- 51. Dispersion of foundation mound
- 52. Extension 400 m, amount unknown
- 53. Dispersion of consolidation blocks
- 54. Damaged but amount unknown
- 55. Dispersion of dissipation works
- 56. Natural conditions
- 57. Visually measured
- 58. Unknown
- 59. Wave direction
- 60. Unknown
- 61. Tidal level
- 62. Duration
- 63. Wind velocity
- 64. Peak 30 m/sec
- 65. Method of restoration
- 66. The damaged parts were left untouched; wave dissipation works placed in front; the 9 m of the breakwater head used 25.0t triangular blocks and in addition 90.3 m used 15.0t triangular blocks; 26.0 m on the original placed side from the crooked section was restored with poured concrete as a foundation on the outer harbor side.

aguash gand savefete not fifther

member fromps, outside on the column of the columns of the columns

被災施設位置的





12. Yagishiri Harbor

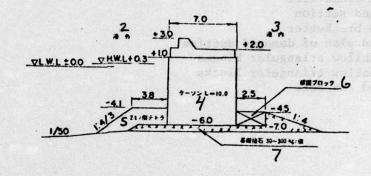
Key:

- 1. Location of damaged facilities
- 2. North breakwater
- 3. Damaged section
- 4. South breakwater
- 4. Ground plan of damaged section
 6. 15t hollow triangular blocks
 7. 25t hollow triangular blocks
 8. Poured concrete

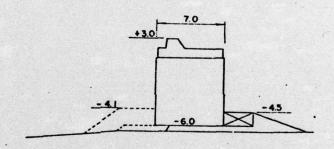
TALL BRIDE .

and the second state of the second second

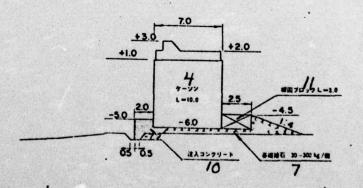
被災前断面図(A-A)



被災時断面凶(A - A)



復旧断面図(A-A)



12. Yagishiri Harbor

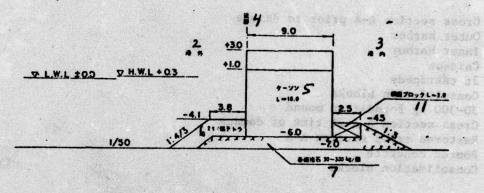
Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. 2t tetrapods
- 6. Consolidation blocks
- 7. 30-300 kg foundation mound
- 8. Cross section A-A at time of damage
- 9. Restored cross section A-A
- 10. Poured concrete
- 11. Consolidation blocks

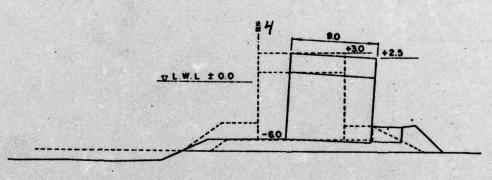
1.4~4) 网络外征证

1901 1742 C

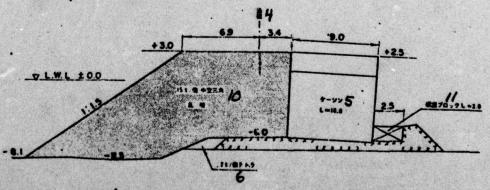
被災前断面図(B-B)



後災時所面図(B-B)



祝旧斯福岡 (B-B)



12. Yagishiri Harbor

Key: 1. Cross section B-B prior to damage Outer harbor Inner harbor Normal 5. Caisson 2t tetrapods 30-300 kg foundation mound 8. Cross section B-B at time of damage Restored cross section B-B 10. 15t hollow triangular random rubble 11. Consolidation blocks 中部的7年上,2月1日十二月日中国报公司的《中国报》的第二日第二日报 Mar of Bank Thomas THE OTHER PROPERTY. action of the m MESKI Transport of the second TOR DOCAMARKS DESCRIPTION LAVORS CONTRACTOR

| | | т | 2 南 | 防夜堤 | Y | 造様式 4ケーツ | | |
|-------|-------------|----------------|---|---|---------------------------------|---|---------------------------------------|--|
| 完成年月日 | | 6大正5年 | | | 7破災年月日 8昭和 4 0年 2 月 2 1日 9(低気圧) | | | |
| 被状 | 10 税 | Harm Control | | ピプロック、袋鼠 クリートが破り | ョンクリート) 破壊またに とした。 // | | 本体ケーソンが傾斜 | |
| | 13 | | | 寸 15 法 | 1 0.6×7.88×不明 f | 號 0.5 隔壁 0.3 ! | 5 底盤 0.6 16 | |
| | 立 | 1 | 14 | コンクリート 鉄 /9 筋 | 不明/8 | E STANDARDS | | |
| 12 被 | 122 | | | 中 20 H | 不明/8 | 学位体验重量 | 不勞 | |
| | | 上部 | 以所有4 | ンクリート | 不明/8 | | | |
| | 22 | * 6 | 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | H L)×1.2×不明 袋詰コン | 111-124 | | |
| 类 | 75 | 校 | 37., | # L26 | 1 L 18 | ++- | | |
| | | Selection of | 34., | た し26 | i x x y 18 | -: \ | • | |
| 11 | 6 | m #34 | | t 126 | • | | | |
| | 37+ | その他 | | te L26 | | | | |
| | | 32 股計資料 | | 数 33 高 | 不 明 18 | 被 34 旺 | 不 明 /8 | |
| | | | | 周 35 期 | 不 明/8 | 入36射 角 | 不明/8 | |
| | 38 | 3 | 提件 | 89十八月 | te 126 | | | |
| 37 | N N | 立 提 体 | | 76 領 科 最大2°4/ 現有 の 状 記 差徴プロックの破損、袋詰コンクリート抜け出し、上部工院線 43 | | | | |
| 被 | 炎 | 22 | * 6 | 140 M & | _ | | 7. | |
| | 数 | 拾 | * * | 450 M & | 維外、基礎プロック依損 袋詰コンクリート、延長 | . 延長86.7m 193.4m 273 | 2 46 | |
| 爽 | * | 石部 | | アポプラの散乱 な し26 | | | | |
| | | | | 480 m & - | | | | |
| | - | 32 + 0 Mz | | | - 50 | ,, | 1 | |
| 助 | L | 49 数 自然条件 数 | | | H 1/3 = 4.9 2 m (実例) | NAME OF TAXABLE PARTY OF TAXABLE PARTY. | ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` | |
| | 自然 | | | 27 W | N 2 8 0° | 期 52 位 風 54 進 | ZM WANT 1125 6- | |
| • | 1 | | | | 」。 ひまま放促すると幾体の鉄 | | | |
| 復 | 56 IB 75 | 技 | | | 関目しその前面をテトラボ | | | |

-

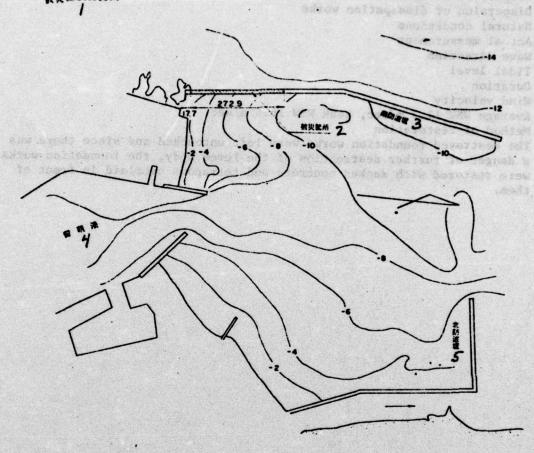
13. Rumoi Harbor

Key:

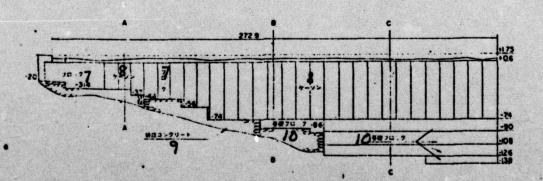
- 1. Regional facility name
- 2. South breakwater
- 3. Construction method
- 4. Caisson-type vertical breakwater
- 5. Date completed
- 6. 1916
- 7. Date damaged
- 8. 21 Feb. 1965
- 9. Low pressure
- 10. Damage status
- 11. Foundation (foundation blocks, sacked concrete) destroyed or broken loose; therefore, the main caisson body tilted and the upper concrete part was destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. L unknown; sidewall 0.5, compartment wall 0.35, base plate 0.6
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Blocks, L unknown; sacked concrete
- 25. Overlay
- 26. None
- 27. Consolidation blocks
- 28. Inside harbor
- 29. Precast concrete armor units
- 30. Wave dissipation riprap
- 31. Other
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Maximum 2°
- 42. Condition of levee body damage
- 43. Foundation blocks damaged, sacked concrete came out, and superstructure destroyed
- 44. Dispersion of overlay
- 45. Dispersion of foundation rock

- 46. Outside harbor, foundation block damage, extension 86.7 m; sacked concrete extension 193.4 m, 273 m³
- 47. Dispersion of consolidation blocks
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Actual measurement
- 51. Wave direction
- 52. Tidal level53. Duration
- 54. Wind velocity
- 55. Average WNW 11.2 m/sec, peak WSW 16.4 m/sec
- 56. Method of restoration
- 57. The destroyed foundation works were left untouched and since there was a danger of further destruction of the levee body, the foundation works were restored with sacked concrete and tetrapods overlaid in front of them.

被災施設位置國



被災國所發斯凶



35

13. Rumoi Harbor

一、(人人人) 经边际的股份

* TANA 3 解解 排放 9/1

Key:

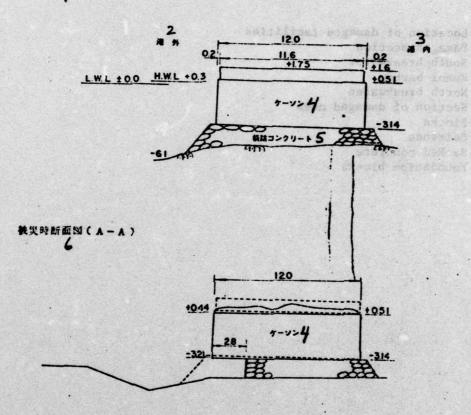
- 1. Location of damaged facilities
- 2. Damaged section
- 3. South breakwater
- 4. Rumoi harbor
- 5. North breakwater
- 6. Section of damaged area
- 7. Blocks 8. Caissons
- 9. Sacked concrete
- 10. Foundation blocks

Service Both Street Co.

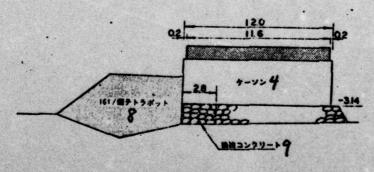
学《上版图》至新班/

neduck looms . Ci

被災前断面図(A-A)



復旧断面数(A-A)



13. Rumoi Harbor

《京三年》原始如何是第一

IN-EINERSON

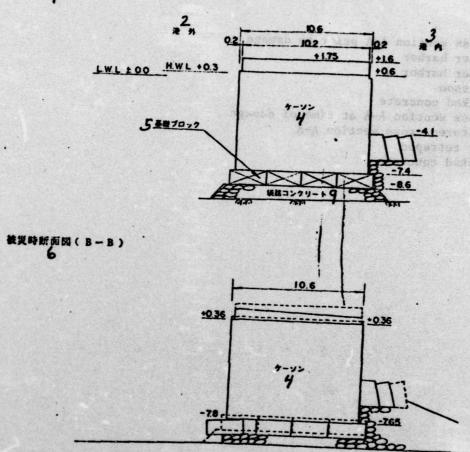
Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. Sacked concrete
- 6. Cross section A-A at time of damage
- 7. Restored cross section A-A
- 8. 16t tetrapod
- 9. Sacked concrete

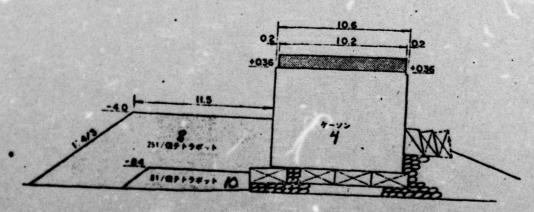
-55

44 501 17

被災前断面図(B-B)



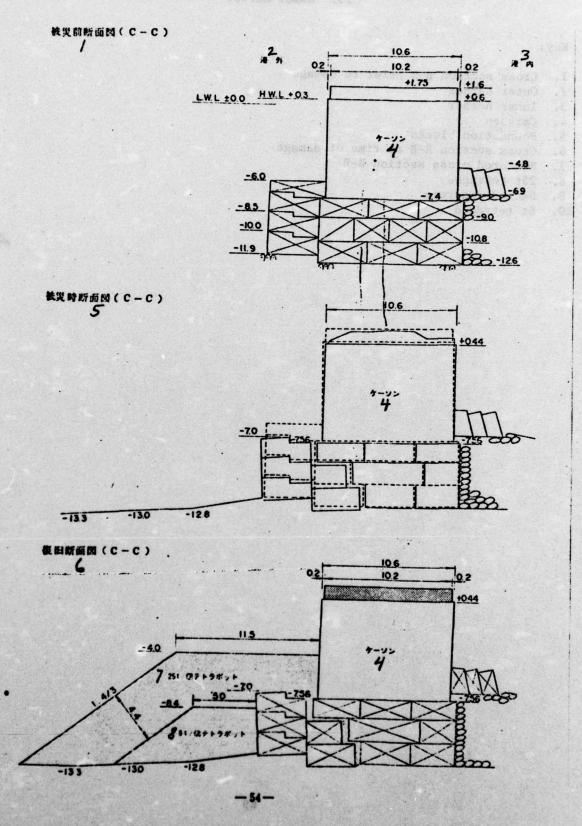
復用所顧問(ヨーB)



13. Rumoi Harbor

Key:

- 1. Cross section B-B prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. Foundation blocks
- 6. Cross section B-B at time of damage
- 7. Restored cross section B-B
- 8. 25t tetrapod
- 9. Sacked concrete
- 10. 8t tetrapod



13. Rumoi Harbor

Key:

- 1. Cross section C-C prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. Cross section C-C at time of damage

型 02 時

- 6. Restored cross section
- 7. 25t tetrapod
- 8. 8t tetrapod

NR 事士 18 单门28 电

如果 6 m Cat 11

| | 区 施 1 | | | | | 構造様式 4ケーソン | | |
|-----|------------|--|------|---------------|-----------------------------------|-------------|--|--|
| 完成年 | F月日 | - | 15年 | | 7被炎年月日 8昭和 4 0 | | | |
| 被状 | 10 & | 数浪 | の反復に | はり、前面法先 | の洗船もあって被復石ま | ≈よび 基礎拾石が散呑 | toka dokasia seon dokasi redi dokasi redi | |
| | 13 | | | 寸 15 株 | B H L 6.06×6.6×不明 | 部材厚は不明 16 | edijas seotias | |
| | | 4 | 4,, | コンタリート | 不明/8 | • | NAME OF THE PARTY OF | |
| /2 | 立 | | | 共 19 新 | 不明/8 | | \$0000 1.00 d | |
| /2 | 部 | | | 中 20 結 | 不明18 | 単位体積重量 | 不明 | |
| | | 上部 | 場所計= | ンクリート | 不明/8 | | | |
| | 22 | M. C | 持石 | 30~300kg | 個24 | 1 | | |
| 災 | 捨 | 被 | E I | 巻外内とも捨る | 1~21/個26 | | | |
| | 石 | STATE OF THE PARTY | 12.0 | ts L28 | | | | |
| | 都 | 俏彼 | 19,0 | ts L28 | | 1 | | |
| 前 | | 育 政 括 石 | | ts L 28 | | | | |
| | 31 + | その他 | | ts L 28 | | | | |
| | | 32 | | ₩ 33 M | H 1/3 = 3.0 m | 被 34 旺 | 不明18 | |
| | - EX | 61 JA | | 期 35 期 | 7. 0 sec | 入36射 角 | β = 6 0° | |
| | 20 | 13 | 提件 | 39+ ~ 1 | ts L 28 | | | |
| | 38 立 | 立 | 提体 | 48 44 41 | ts 128 | | | |
| 37 | 災 | 部 | 提体 | 戦後の状況 | ts L28 | | | |
| | ^ | | | 10散乱 | 現 巻外, 延長 180.0 m. 数量不明 一種内, なし 43 | | | |
| | 數 | | | 石の散乱 | . 港外, 延長 180.0 m. 数量不明 45. | | | |
| 炎 | R | # # # # # # # # # # # # # # # # # # # | 根固プ | 一号クの数乱 | | | | |
| | | | 俏故 | 146 版 和 | - | | | |
| | | 31 - | ŧ | o 1ta | - | | | |
| 14 | ,,, | 投 按 数 | | 33 A | H 1/3 = 4.0 m | m 35 m | 不明/8 | |
| | 自然 | | | 49 🛍 | 不 剪/8 | M 50 W | 不明/8 | |
| | | | 杜 | 税5/時間 | 不明/8 | 風 52 速 | 不明局 | |
| a | 53 旧方 | 胀 | 起外 | 側に根因プロップ | 7を致け、1~2 1/個 54 | の割石で被優した。 | | |

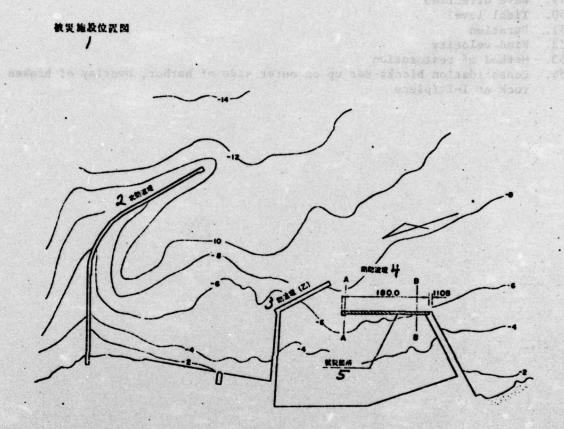
14. Yoichi Harbor

Key:

- 1. Regional facility name
- 2. South breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1940
- 7. Date damaged
- 8. 17 Dec. 1965
- 9. Low pressure
- 10. Damage status
- 11. The front normal scoured by repeated strong waves, and the overlay rocks and foundation mound were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. L unknown, member thickness unknown
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Outside and inside harbor riprap 1-2t/piece
- 27. Consolidation blocks
- 28. None
- 29. Precast concrete armor units
- 30. Wave dissipation riprap
- 31. Other
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. Dispersion of overlay
- 43. Outside harbor, extension 180.0 m, amount unknown; inside harbor, none
- 44. Dispersion of foundation rock
- 45. Outside harbor, extension 180.0 m, amount unknown

- 46. Dispersion of consolidation blocks
- 47. Dispersion of dissipation works
- 48. Natural data
- 49. Wave direction
- 50. Tidal level
- 51. Duration
- 52. Wind velocity
- 53. Method of restoration
- 54. Consolidation blocks set up on outer side of harbor, overlay of broken rock at 1-2t/piece

4 余 市 id an 推加 in the makes of all place notoscianth to make more



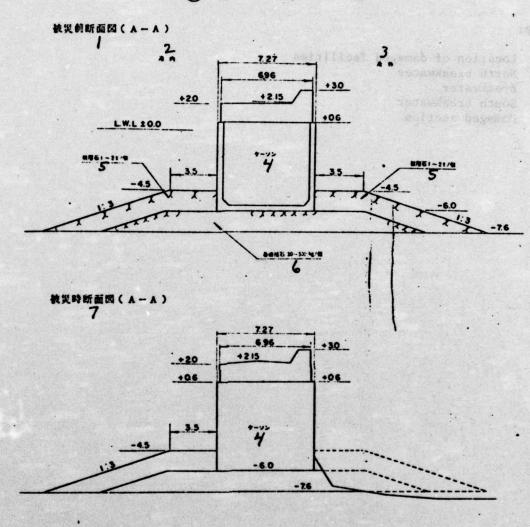
14. Yoichi Harbor

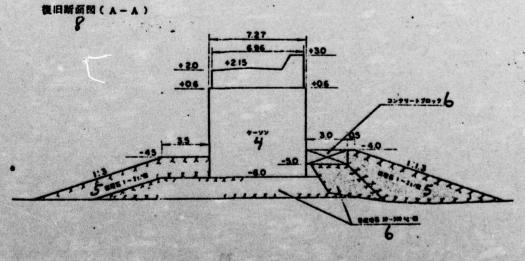
Key:

- 1. Location of damaged facilities
- 2. North breakwater
- 3. Breakwater
- 4. South breakwater
- 5. Damaged section

一颗一

to and





14. Yoichi Harbor

Key:

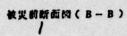
- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Caisson
- 5. 1-2t overlay
- 6. 30-300 kg foundation mound
- 7. Cross section A-A at time of damage 8. Restored cross section A-A

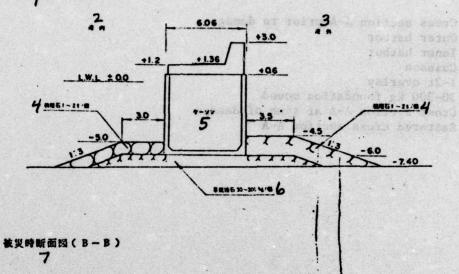
PERMIT

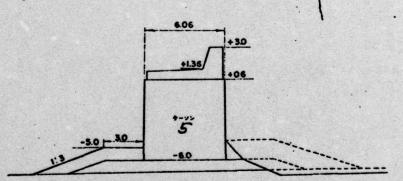
\$15 E 18 HOW

9877 - SPA

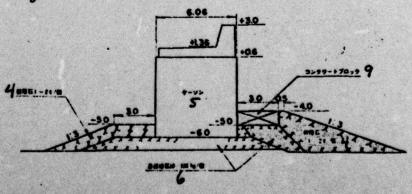
· 并有一名 > 的原物体的







後旧新面図(B-B)



14. Yoichi Harbor

HALL THE B DE B

CZ FINA PRES ARIA O CT A A

The ment and

Non-All mark

**AnoAnotalaning (新年) ロギーのでものでは、大阪の・モルリ股の 会は日本の大の大きに次の技術でのことと、より大阪の「ボデリスカルドラー」 では20世界がモルラストを開きまるような特別には、10世界のモルルストルファン。

TEM ASSOCIATION WAS NOT

HARLET BE BE

25 · 中 | 海湖口 1 1 大田田

我搬商员

Key:

- 1. Cross section B-B prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. 1-2t overlay
- 5. Caisson
- 6. 30-300 kg foundation mound
- 7. Cross section B-B at time of damage
- 8. Restored cross section B-B

TE 数 册上的

对文章发生性 经强大

M AF M

数 连汇 跳

9. Concrete block

| 完成年 | 年月日 | 653 45 | 140年1 | 1月 | 7被火年月日 8昭和 4 1年 3 | 月5~6日 | 9(低级压) | |
|-----|------------|----------|----------------|-----------------------------|---|-----------------------|----------------------------------|--|
| 被状 | 10 克 | | 3工が8 9 散乱被災 | | 系が破壊し荷放工(8.0 t/ | | | |
| | /3 m | | | 寸 /5 法 B H L | | | | |
| 12 | 立 | 1-42 | | コングリート | 不 明/8 | • | inna e Euro | |
| | 都 | | | 美 19 筋 | 不明/8 | 1 | a Santa Carrier | |
| 被 | | 上部場所打空 | | 中 20 結 | 8 2/ | 単位体積重量 | 不明 | |
| | 23 | | 另所打- | 30~300kg | 不明18 | | | |
| 爽 | # | | 26 I | | / -25 | ++- | | |
| | 75 | | 39., | | H L B H L .5×2.0 2.4×1.5×2.0 | | | |
| | | | 36.0 | 3.0 ~ 1.5 ~ 2.4 ~ 1.5 ~ 2.5 | | | | |
| 10 | | 稍被 | 3 | ts L 28 | | | | |
| | 33+ | その他 なし29 | | | | | | |
| | | 段計資料 | | 故 35 高 | H 1/3 == 5.4 6 m | 被 36 E | 砕 故 37 | |
| | - | | | m 38 m | 1 1.0 sec | 人列射 角 | B= 11° | |
| | 41 | 漫类体 | | 42 + × 9 1x 128 | | | | |
| | 41 | 23 抽 | 提件 | 48 模 料 | t L28 | | | |
| 40 | 爽 | | 提体 | W a C 状况 | 上部工およびケーソンのを | W 45 | | |
| | 故 | | 被程 | 10数乱 | | | | |
| | R | 5 | * * | 石' 0 数 乱 | 128 | · | | |
| * | | | 校園プ | | | | | |
| | | 33 年 0 他 | | | 延長、2522m, 数量不明 50 | | | |
| P | - | SI 数 | | 0 NE | H max = 4.0 m (推定) | m 38 m | 不明局 | |
| | | | | 53 A | 不明18 | m 54 & | +0.73m | |
| | | | | MSZM M | 不明18 | W 22 W | 中的 NW 16m/ser 网数 NW 31.1m/sec | |
| ă. | 58 B 77 | * | ## *+ | したケーソンは、 3.5mにして似! | 注入コンクリートにて復旧 日、甬鼓工は、1.5~2.0 t ッドを統用、さらに表層を1 | 上部工は+ 1.0 構改石を施工しる | 5 5 mであったもの との上に被災した | |

15. Iwanai Harbor

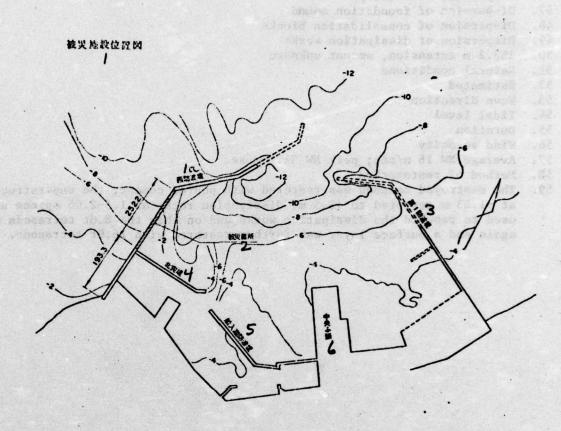
Key:

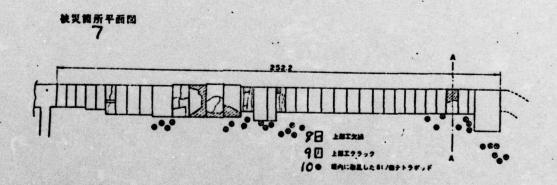
- 1. Regional facility name
- 2. West breakwater (A section)
- 3, Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Nov. 1965
- 7. Date damaged
- 8. 5-6 Mar. 1966
- 9. Low pressure
- 10. Damage status
- 11. 89.4 m of superstructure and one caisson destroyed; 252.2 m of dissipation works (8.0t tetrapods) were overreached, dispersed, and damaged.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Per piece
- 26. Overlay
- 27. None
- 28. None
- 29. Consolidation blocks
- 30. Inside harbor
- 31. Precast concrete armor units. 8t tetrapods random rubble
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. Levee body slope
- 44. Condition of levee body damage
- 45. Superstructure and caissons destroyed

- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. Dispersion of dissipation works
- 50. 252.2 m extension, amount unknown
- 51. Natural conditions
- 52. Estimated
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. Wind velocity
- 57. Average NW 16 m/sec; peak NW 31.1 m/sec
- 58. Method of restoration
- 59. The destroyed caisson was restored with poured cement; the superstructure at +1.65 m restored to +3.5 m; dissipation rocks at 1.5-2.05 apiece were used to rebuild the dissipation works and on them the 8.0t tetrapods used again and a surface layer was further restored with 16.0t tetrapods.

everani BP

京山东京大学教训并至3届第200年,由约5





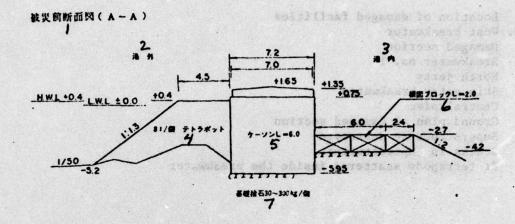
15. Iwanai Harbor

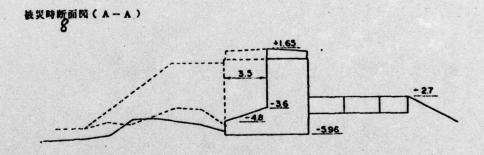
Key:

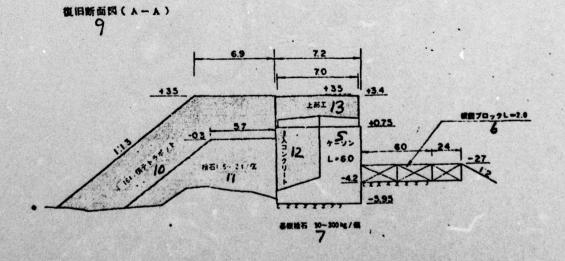
- 1. Location of damaged facilities
- la. West breakwater
- 2. Damaged section
- 3. Breakwater no. 1

- 4. North jetty
 5. Ship entry breakwater
 6. Central pier
 7. Ground plan of damaged section
- 8. Superstructure destroyed
- 9. Cracks in superstructure
- 10. 8t tetrapods scattered inside the breakwater

1. 本一本,是問題開稿







. 84

15. Iwanai Harbor

Key: Cross section A-A prior to damage 2. Outer harbor as a first and selection and selection of the selection o Inner harbor 3. 8t tetrapod 5. Caisson Consolidation blocks 6. 30-300 kg foundation mound 7. Cross section A-A at time of damage 8. Restored cross section A-A 9. 16t tetrapods 10. 11. 1.5-2t riprap Poured concrete 12. 13. Superstructure Pagalaist . Part - Language Mark 1998 State 1998 Extended a von Bush Cold Burnsham College College College College The street of the state of the -- 63 --

| /地 | X At | 设名 | 2M 0 | 方 波 堤 | 34.4 | 世様式 4ケーソ | ン式程成设 | |
|------------|-------------------|-----------------------------|-------|------------------------------|--|---------------|--|--|
| 完成年 | F月日 | いる | 4 0年1 | 1月 | 7被災年月日 7四和 4 4年 | 2月5~6日 | 9(低级压) | |
| * | 10 克 | | | 曲部であり茂が 飲さいが硫出し | ※集中しその敬視によりケー: ・た。 // | ソン2頭が移動し Q | . 5 5 1 適は側壁が ************************************ | |
| | 13 | 1 | | 寸 /S # | B H L 部材 11.5×9.3×7.5 部材 | 厚不明 化 | gell # Malkens | |
| | | 14 | | コングラート | C = 3 3 0kg. W= 1 5 5 | ke. S=669k | s. G = 1 1 5 2kg | |
| | 立 | 7 | ,,, | # 18 B | 6 0.kg/m² · | i mornina. | artis de la compania | |
| /2 被 | 舒 | | | th 19 28 | Man 20 | 单位体被监督 | 2.1 1/1 | |
| | | 上部 | 場所打 | シクリート | C= 2 7 0kg, W= 1 3 8i | 4. S=664kg | . G=1258kg | |
| | 22 | * 6 | 看石 | 30~300k | 公侧24 | | | |
| 爽 | 拾 | 被 | L | 赤外内とも格 | 石1~21/四26 | | | |
| | 75 | 機関子了。力 機改多名。力 機 最 看 石 | | 28 B H L 29 B H L 20×2.0×2.0 | | | | |
| | 部 | | | t L 3/ ·· | | | | |
| 113 | | | | t L 31 | | | | |
| | 33+ | 0 (| EL . | なし31 | | | | |
| | | 34 R # # # | | # 35 A | H 1/3 = 4.8 m | # 36 B | 种 故 37 | |
| | | | | m 38 m | 1 1 sec | 入39州 为 | \$ = 0° | |
| | ш | 13 | | 82+ ~ p | 2辆, 最大1.55m 43 | | | |
| | 英数 数 | | | 44 4 6 | | | | |
| 40 | | 85 | 提休 | 数数の状態 | ナーソン、 藪コンクリー | · 被粮、中结妆的 | HL 454 | |
| | | 22 | 被权 | HO 版 新 | . te L 31 | | | |
| | | 5 | * 0 | 老の散制 | | • | | |
| * | | 25 | | 48,00数部 | | * | | |
| | | | | 190 数 数 | · - | | | |
| | | 33 ± | | の 他 | - H 1/3=5.2m (契約) | | | |
| * | \$108 ST FABRACIO | | | | | m 38 m | | |
| | 自然条件 故 | | 13 W | NW SS | m 54 6 | | | |
| | | | | #\$ 5 \$ | 不明 \$2 | M 56 x | 平均 W 180元 isc 所放 NW 30.82. isc | |
| Q (| 58' A 7 | 株 | (11) | および割石(中 | 部工を除去し中籍の抜け出し および港内側)にて補充し。 1/例 中型三角プロック 2 M 59 | 差外側には消滅 | 工として、前肢地石 | |

16. Iwanai Harbor

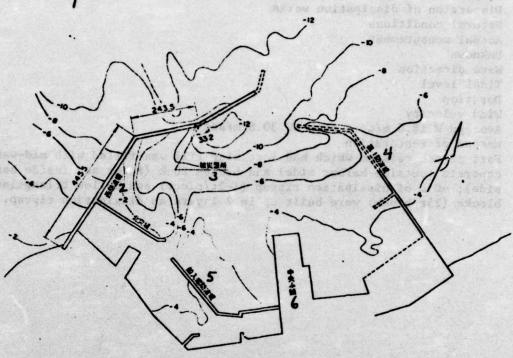
Key:

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Nov. 1965
- 7. Date damaged
- 8. 5-6 Feb. 1969
- 9. Low pressure
- 10. Damage status
- 11. This section is on a crooked part and concentrated waves shifted 2 caissons; one caisson destroyed the sidewall and slag fill spilled out.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Slag. Unit volume weight 2.1t/m3
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Riprap 1-2t/piece inside and outside harbor
- 27. Consolidation blocks
- 28. Outer harbor
- 29. Inner harbor
- 30. Precast concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. 2 caissons a maximum of 1.55 m
- 44. Levee body slope
- 45. Condition of levee body damage
- 45a. Caissons and base plate concrete destroyed, fill released

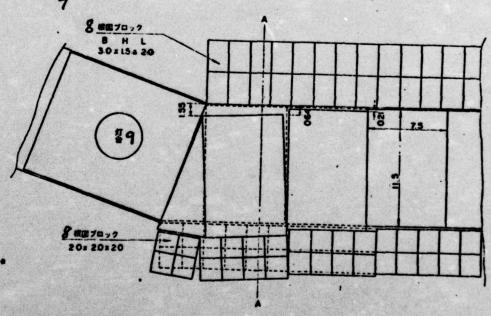
- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. Dispersion of dissipation works
- 50. Natural conditions
- 51. Actual measurement
- 52. Unknown
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. Wind velocity
- 57. Average W 18.0 m/sec; peak NW 30.8 m/sec
- 58. Method of restoration
- 59. Part of one caisson which had lost slag fill was filled with mid-water concrete (outside harbor side) and broken rock (inner and inside harbor side); 40 m of dissipation riprap (1-2t/piece) and hollow triangular blocks (25t/block) were built up in 2 layers as dissipation riprap.

DS+OS FEE

被災施設位置開



後災箇所平面図 7



16. Iwanai Harbor

·· / A ·· 水 / 按照标序设施

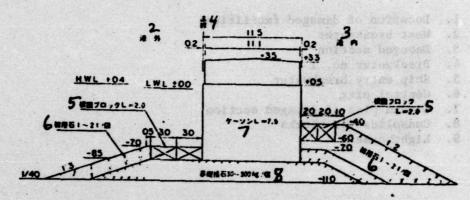
[本一本] 地區的計畫

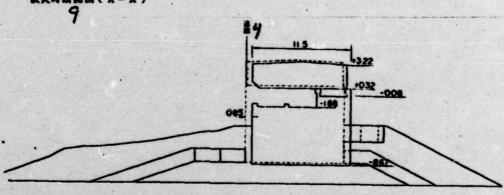
Key:

- 1. Location of damaged facilities
- 2. West breakwater
- 3. Damaged section
- 4. Breakwater no. 1

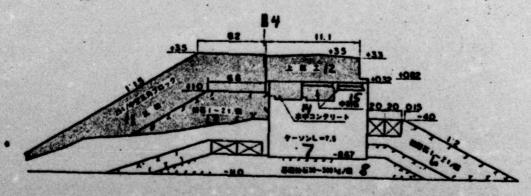
- 5. Ship entry breakwater
 6. Central pier
 7. Ground plan of damaged section
 8. Consolidation blocks
- 9. Lighthouse

被災的新函図(A-A)





後旧所書間(A -A) 10



16. Iwanai Harbor

| | | to a title is a sold of a silver of | | | | |
|--|--------------------------------------|--|--|--------------|------------|---|
| cross section | A-A prior | to damage | A | | | |
| Outer harbor | a prior | at an termination of a | 43 24439 | 10 .da | | Par |
| inner harbor | | | | | | |
| Normal | | | | | | |
| Consolidation | blocks | | | | | |
| Caisson | Mary Turker 517 | should be to be ten | | | | |
| 30-300 kg four | ndation mo | und X d | | | | |
| cross section | A-A at th | me of damage | | | | |
| Restored cross | section i | A-A | | | | |
| 5t hollow tr | | locks | 推 有是 证 | | | |
| Superstructure L-2t riprap | | | | | | |
| id-water con | crete | | | | | |
| lock drawn in | | | 1000 | | | |
| | | TE STATE OF LARKING | | | | |
| | S A WITTER | A. Maria Sala | | | | |
| | | | | | | |
| | | | 18 T 35 | 100 | | |
| | | | W 2 3 | | | |
| | | | 48 5 2 | | | |
| C. C. Carlon | 1 00 00 | | and the same of th | | | |
| | | med west full | | | | |
| | el High | 1 200 | 20 76 20 | | | |
| | | 261.2 | 2.3 | | | |
| | | 69 | 2 % BY | | 195 195 | 1.54 |
| | | the transfer of the same that the same of the same of the | | | | |
| | | | *** | | | |
| | | Service meat 28 | 4 图 四型 | 10° 15 | 9 | |
| | | \$4.6-4214 (\$13.13.13.13) | | | - 04 | |
| Part of the second state of the second | Opening to the second | | | | 126 | |
| | Tribus Proposition Re | research and the second | | | | |
| | Married World Control of the Control | | 2 * 34 | 為海 | | |
| | | | | | 48 | |
| The state of the s | 88 8 8 | | | | 2 8 | |
| | THE REPORT | YES INO S - SOUTH | 4 44 | Springer and | | |
| 维莱森中。 | 2 34 0 | The state of | 旗 被。 | - | | AND |
| waster a | M CT M | 411 | de in Cara | | | |
| | Personal of Consult Second | Company Service of Service Ser | The second second | 100 | Light Sa | 101 |
| 就才有一样的决定) | 中華をはままり | | | | | 2 |
| | | N. N. | | 77 | - 15 | 100 |

| 完成年 | | | 2四 防38年 | W # | 7被災年月日 | PB #0 4 2 年 : | | | 式提成獎 | AE) |
|-----|----------|-----------|---------|---------------------|------------|--------------------------------------|--|--------------------|----------------|------------------------------|
| * | 10克 | | | 腰石が散乱。 と | | CONTRACTOR OF | 4000 | | TOURS | d tongs to tong fan is |
| | 13 | | עו | す 15 性 | A部 5.5(| 1.5)×10.0×7 | L B# 9.0 | ×) 1.0 | ×10.0 M | 材料不明 |
| | 立 | *- | 77 | # 19 B | 不 明/8 | amab 16 | Sels 1 | 1.0-8 | | |
| /2 | * | | • | ф 20 B | 8 | 2/ | 単位体制 | 122 | 不明, | 1 96° 92° |
| | | 上部 | 72 | ンクリート | 不 男/8 | | | | 30970 | ta este |
| | 23 | * 6 | 格石 | 90~300k | | | <u>_</u> | | | |
| 英 | 75 | * | H I | | | 0 0kg/@ 2 (A部)海外 _{1.2} (| ACCURATE AND ADDRESS OF THE PARTY OF THE PAR | E" 4 | , | H L |
| | ** | *** 34 | | なし32 | 0×1.5×2.0, | (ABI) (E7) 1.2 | (1.7)×2.0× | 2.0, | 2.7(3.0) | <1.5×2.0 |
| 10 | | 用设备石 なし32 | | | | | | | | |
| | 34+ | 0 1 | ŧ | な し32 | | | | | | |
| | . R | 35 H H | # | 被 36 萬 期 39 期 | + | .8 m. 5.5 m | # 37 240H | Æ | # 18° | 9 |
| | | 13 | 10 41 | 83+ ~ 0 | t L 32 | j. | 1000 | | | |
| - | 4/2 # | 立提供 | | 44 W | # 12 L32 | | | | | |
| 41 | | 都 | 提体 | あの状況 | # L 32 | | | | | |
| • | 炎 | 23 | 被极 | 160 M a | MEN. 10 | 9m. 2400 | 7 | | | |
| | 数 | * | * 60 | 50 M & | 被覆工化含 | DT1.8 49 | | | | |
| 类 | | 章 概 模型 | | 50,0数规 | | 9m, 60# 5 | SI | | | |
| • | | | 務故 | Fon a | - | | | | | |
| | | 34 | 2 | 0 14 | - | | | | | |
| | 自然条件 数 の | | × | 36 4 | | .0m(目前) | M 39 | | 不 明/ | <u> </u> |
| | | | 55 M | 不明/8 | | # 50 | | Manager Ing Street | | |
| | | | * | 107年 10 | 186 | | N S | 7 3 | 平均 8~W 系数 S | 31.0 m/m |
| | 60 | | I. | 2 5 0 kg/#/s/ Ro | 上の指石で復 | GI. | ELTIN | ** | 2三角プロッ | /t% |

17. Hakodate Harbor

Key:

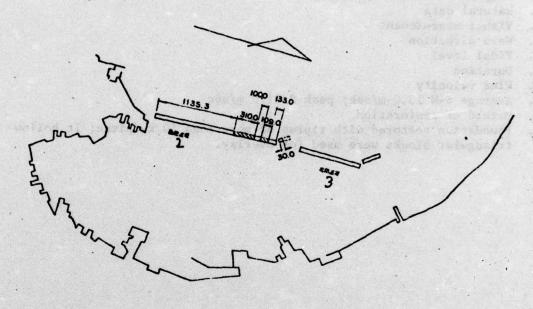
- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1963
- 7. Date damaged
- 8. 22-24 Mar. 1967
- 9. Low pressure
- 10. Damage status
- 11. Foundation riprap and overlay rocks dispersed; because of this foundation blocks settled and were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Per piece
- 26. Overlay
- 27. (B part) riprap of 90-800 kg/piece outside harbor
- 28. Consolidation blocks
- 29. (B part) outer harbor, (A part) outer harbor
- 30. Inner harbor
- 31. Precest concrete armor units
- 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Clapotis
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide
- 44. Levee body slope
- 45. Condition of levee body damage

- Dispersion of overlay 109 m extension, 2400 m³ 46.
- 47.
- 48. Dispersion of foundation mound
- 49. Included in overlay
- 50. Dispersion of consolidation blocks
- 51. 109 extension, 60 blocks
- 52. Dispersion of dissipation works
- 53. Natural data
- 54. Visual measurement
- Wave direction 55.
- Tidal level 56.
- 57. Duration
- 58. Wind velocity
- 59. Average S-W 13.0 m/sec; peak S 31.0 m/sec
- 60. Method of restoration

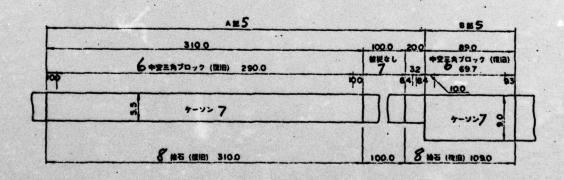
SERVICE ME TO

61. Foundation restored with riprap of more than 50 kg/piece; lt hollow triangular blocks were used for overlay.

被災施設位置図



被災債所平面図 4

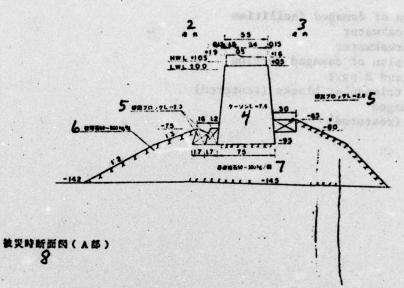


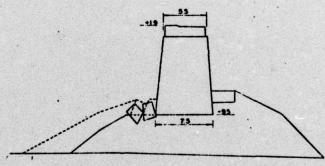
17. Hakodate Harbor

Key:

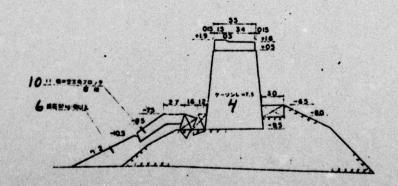
- 1. Location of damaged facilities
- 2. West breakwater
- 3. North breakwater
- 4. Ground plan of damaged section
- 5. A part and B part6. Hollow triangular blocks (restored)
- 7. Not damaged
- 8. Riprap (restored)

被災前断面図(A部)





復旧新面図(A部) 9



86

17. Hakodate Harbor

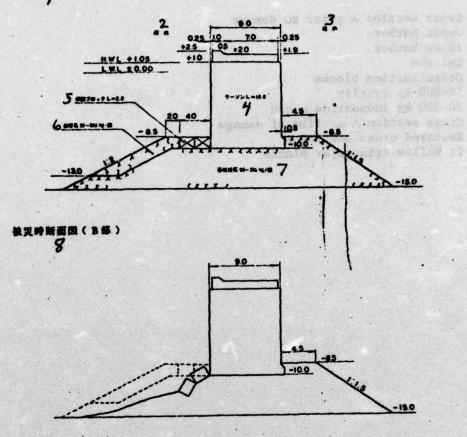
Key:

- Cross section A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- Caisson
- 5. Consolidation blocks
- 6. 50-800 kg overlay
- 7. 50-300 kg foundation mound
 8. Cross section A at time of damage
 9. Restored cross section A
 10. 1t hollow triangular blocks

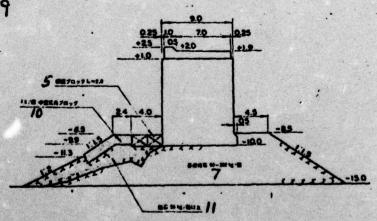
A NAME OF

工作企工時報報告數

被災前断面四(B部)



製旧新藤間(3部) Q



17. Hakodate Harbor

MALL STREET

中华汉田

BYTERATE SAME BY STREET

Key:

- Cross section B prior to damage
- Outer harbor 2.
- Inner harbor 3.
- Caisson
- Consolidation blocks 5.
- 90-800 kg overlay 6.
- 7.
- 90-300 kg foundation mound Cross section B at time of damage

THE THIRD SUCTE OF STATE OF

were the the military section.

WELLIA THE VO. NO.

STATE OF STA

- Cross section B restored 9.
- It hollow triangular blocks 10.
- Riprap more than 50 kg 11.

4.00 th 3/2 (4)

THE RESERVE OF LEGISLES WELL IN THE RESERVE WITH

\$4 150 mg , 100 mg . 15 mg

STANDS IN COLUMN TO THE WILL BEFORE A STANDARD OF THE SECOND STANDARD OF THE SECOND STANDARD OF THE SECOND STANDARD OF THE SECOND SECON

and the second property of the second second

- 10 m

18 新潟東港

| 完成年 | 年月日 | 人昭和 | 040~4 | 4年 | 1 | 被災年月日 8昭和 4 5年1 | 月318 | 1 | 9(低氢压 |) |
|-----|-----------|--------------|---------------|---|------------|---|--------------|--------------------------------|---------------------------|-------|
| 被状 | 10 克 | 前面 | 法先の地 | 盤が洗猟さ | | を使捨石、被覆石が此下版系 // | | | <u> </u> | 0 1 |
| 12 | 13 E | , | 14, , | | - h 165 | 83 (61 | SD 3 0 | The said | 為性 0.25 数性 0 | .6 K |
| 数 | - | - | 2 | 中 19 ta | | 20 | + 0.4 | 技工社 | 个男 | |
| | - | 上部 | 44 | ショリー | | ese = 1 6 0kg/cm | +1 | | | |
| | 122 | 22 2 2 2 3 2 | | 200~5 | | | 41 | | | |
| 英 | | 被 | 25 I | | | 11/位26 | 1 | | | |
| . 6 | 7 | | } | CONTRACTOR OF THE PARTY OF THE | |) B H L 4.5×1.5×2.5 | | | | |
| 69 | - | 商技 | 77 | 1 12 130 | | | | | | |
| • | - | m a | # # to to 130 | | | | | | | |
| | 322 | 0 th 12 L 30 | | | | T: : | | | | |
| | | 33 | 14 | # 34 | * | H 1/3 = 6.0~6.6 m | - | SE | 升 故 光 | |
| | - | 1.3 | | M 37 | - | 1 2ac | 138 | 村 角 | β=17°~18 | |
| | 10 | 证 操作 | | 8'+ < 9 2 L30 | | | | | | |
| 20 | | 1 | # # | 43 | - | * 130 | | | | |
| 39 | 爽 | <u> </u> | 提件 | 世界の状 | 农 | 12 130 | | | | |
| | | 22 | 被权 | 1'0 % | 2 | 港外、延長 1,2 0 0 m, 1 | | AND DESCRIPTION OF THE PERSON. | Mac 45 | |
| | | 75 | * * | H.O M | 2 | 港外,発長 1.200m,4.400m 47 延長、264m,100例 49 | | | | |
| * | 2 | | 模器プ | 5000 | 裁 | | | | | |
| | | 用板 | | 16 数 | | - | | | | |
| • | | 32 | t | o' te | \dashv | - 32 | | | | |
| | 9 | S/ 教 教 | | 34 1 | - | H 1/3 = 6.7 5 m (英術) | | 7 19 | 1 3.0 sec | |
| | 自然 | | | 53 1 | - | NW~NNW | | 7 10 | +0.9 1 m 子均 WNW 20.0 m | - |
| | | | | W22P | | 50h | | 56 ¥ | FR WNW 34.3m | Vect- |
| | 58 B 3 | * | | | | 00kg/間で補充保旧、数 施工し、1 k/製物石でを 59 | | | | |

18. Niigata East Harbor

Key:

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1960-69
- 7. Date damaged
- 8. 31 Jan. 1970
- 9. Low pressure
- 10. Damage status
- 11. Basin of front normal scoured; foundation mound and overlay rocks settled and were destroyed; consolidation blocks shifted.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.25, base plate 0.6
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Sand. Unit volume weight unknown.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Riprap of 1 t/piece inside and outside harbor
- 27. Consolidation blocks
- 28. Outside harbor (A)
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. Dispersion of overlay
- 45. 1200 m extension outside harbor, 13,500 m; none inside harbor.

- 46. Dispersion of foundation mound
- 47. 1200 m extension outside harbor, 4,400 m
- 48. Dispersion of consolidation blocks
- 49. 264 m extension, 100 blocks
- 50. Dispersion of dissipation works
- 51. Natural data
- 52. Actual measurement
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. Wind velocity
- 57. Average WNW 20.0 m/sec; peak WNW 34.3 m/sec.
- 58. Method of restoration

就"她生态"。

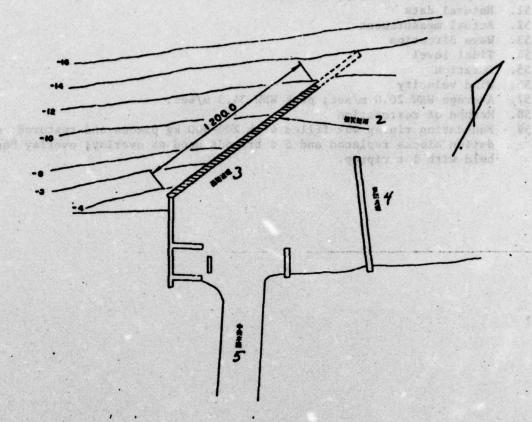
59. Foundation riprap was filled with 200-500 kg pieces and restored; consolidation blocks replaced and 8 t tripods used as overlay; overlay base was held with 1 t riprap.

经产生造品证券

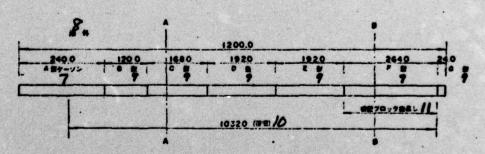
18 新 鳥 東 港

o ODA, A translat mistere policinate a fittle of the property of company that the place of the property of the

被災施設位置內



被災鎮所平面因



18. Niigata East Harbor

建筑的价值加工也一点 1

《本一人》四部的行品

Arragan M.

per support of

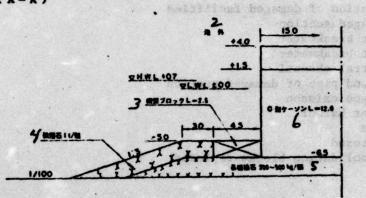
Key:

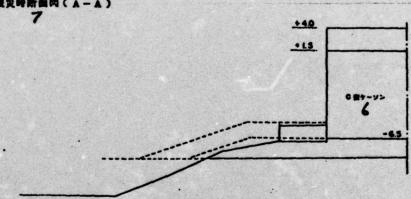
- Location of damaged facilities
- 2. Damaged section
- 3. West breakwater
- 4. East breakwater
- Central channel
- Ground plan of damaged section
- 7. A-type caisson
- 8: Outer harbor
- 9. Type
- 10. Restored
- 11. Consolidation blocks replaced

50.5

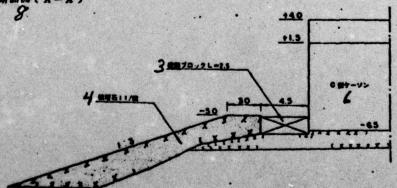
周 東 港

被災前新國関(A-A)





製用新面間(A-A) 8



18. Niigata East Harbor

1.4 一种主题规则的主张

产人是一起设施器建筑的。

AND PROST

This will be

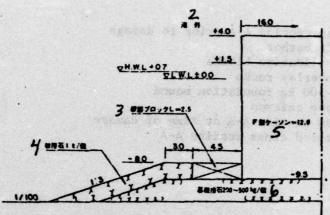
Key:

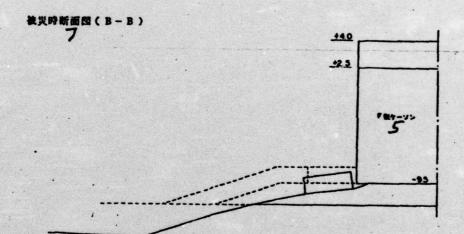
- Cross section A-A prior to damage
- 2. Outer harbor
- 3. Consolidation blocks
- 4. It overlay rocks
- 5. 200-500 kg foundation mound
- 6. C-type caisson
- 7. Cross section A-A at time of damage 8. Restored cross section A-A

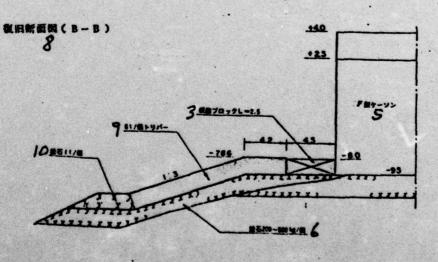
- 18 m

Jan 178 W. M. J.

被災前断面関(B-B)







18. Niigata East Harbor

Key: Cross section B-B prior to damage Outer harbor

- 3. Consolidation blocks
- 1 t overlay
- 5. F type caisson
- 200-500 kg foundation mound
- 200-500 kg foundation mound Cross section B-B at time of damage
- 8. Restored cross section B-B

TIP TIN NO B

THE RESERVE THE PROPERTY OF

SE SE SE CONTRACTOR

- 9. 8 t tripods
- 10. 1 t riprap

The state of the s

transles of be

法 故 统 到

| 地位 | 3 施 | 段名 | 21k B | 方 改 堤 | | 様式 470,0 | | | | |
|-----|-----|---------------------|---|--------------------|------------------------------------|-----------------------|--|--|--|--|
| 完成年 | 月日 | 6831 | 037年(| 消波工) | 7被災年月日 8日和 4 1年 | 月19~24日 | 9(冬期販液) | | | |
| 被人状 | の説記 | 6. 3 | · t/個前 | 放テトラポッド | が420mに亘って散乱した !/ | akug 5-6 c Speks c | Conse sación con el data (con el ciorio (con el ciorio) | | | |
| | 13 | | 14 | 寸 15 株 | B H L 1.8×1.5 又は1.1×1.5 不明/7 | n and though | | | | |
| | 立. | 7 | 14 | 数 /8 筋 | | , | 984 113 3 3 | | | |
| 12. | 邮 | | | 中 19 結 | - | i | 70 000 7 1 1 | | | |
| | | 上部 | 場所打了 | ショリート | 不 明/7 | | | | | |
| | 2/ | * 0 | 22 石 | 100~200 | kg/個 23 | | | | | |
| 炎 | 捨 | | A I | 港外, 拾石1. | 01/個24 | | | | | |
| | 石 | 1000000 | 36,, | ts L27 | | i i | | | | |
| | 都 | | 38., | 6.3 t/個テ | 19#129 | | - | | | |
| 3 | | 商 改 名 な L27 | | | | | | | | |
| | 3/4 | | | | r i i | | r | | | |
| | | 32 81 9 | # | 故 33 高 | | 被 24 旺 | 不 明/7 | | | |
| | | | | 周 35 期 | · | 入36射 角 | β = 0 ~ 30° | | | |
| | 38 | 宣操体 | | 39 ナベリ 40 編 料 | | | | | | |
| 37 | 被 | 部 | | 70 福 斜 | ts L 27 | | | | | |
| 37 | 英 | 21 | | 华の教乱 | ts: L27 | | | | | |
| | 数 | 拾 | | 行の数乱 | | | | | | |
| | 22 | 石邮 | | 出, 10散乱 | | | | | | |
| 英 | | | | | 延長420.2m, 2.011個 化 | | | | | |
| | | 31 | 100000000000000000000000000000000000000 | 0 他 | - | | | | | |
| 時 | | 47 故 33 以条件 故 49 | | 33 A | H 1/3 = 4.5 m (実制) | 刷 35 期 | 不 明/7 | | | |
| | 自然 | | | | 不 明/7 | m 50 th | +0.5 m | | | |
| | | | 粧 | 秋 ⁵ /時間 | 24h | 월 52 送 | 4'15 NW 24.0m/sec | | | |
| | 54 | | 原形 | (B) | | | | | | |
| 视 | 日方 | 樵 | | | | | | | | |

19. Ryotsu Harbor

Key:

- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 1962 (dissipation works)
- 7. Date damaged
- 8. 12-24 Jan. 1966
- 9. Winter season wind waves
- 10. Damage status
- 11. 420 m of 6.3 t dissipation tetrapods overreached and dispersed
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Concrete
- 17. Unknown
- 18. Reinforcing steel
- 19. F111
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Outside harbor riprap 1.0 t/piece
- 25. Overlay
- 26. Consolidation blocks
- 27. None
- 28. Precast concrete armor units
- 29. 6.3 t tetrapods
- 30. Wave dissipation riprap
- 31. Other
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. Dispersion of overlay
- 43. Dispersion of foundation mound
- 44. Dispersion of consolidation blocks
- 45. Dispersion of dissipation works

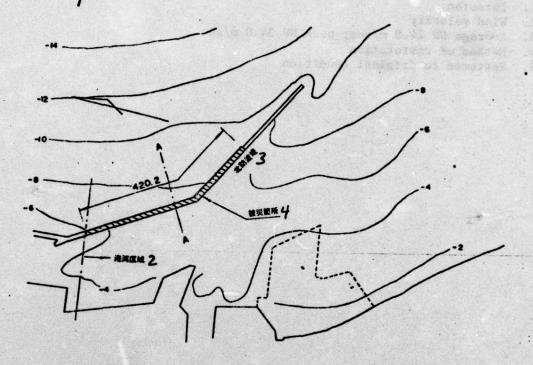
- 420.2 m extension, 2,011 blocks 46.
- 47. Natural conditions
- 48. Actual measurement
- 49. Wave direction
- 50. Tidal level
- 51. Duration
- 52. Wind velocity
- 53. Average NW 24.0 m/sec; peak NW 34.0 m/sec. 54. Method of restoration
- 55. Restored to original condition

(人) 中共美华福州 (在)

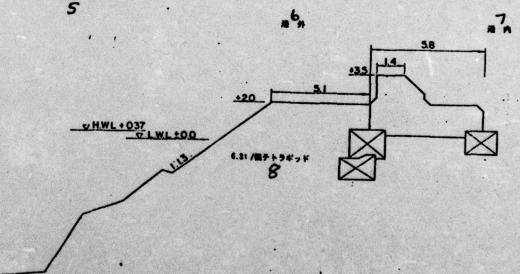
1.4一人工规则到6.3.2.2.

intraerio e 1.01 estiliun Turnis Interviene (Lenna





被災前新面図(A-A) 5



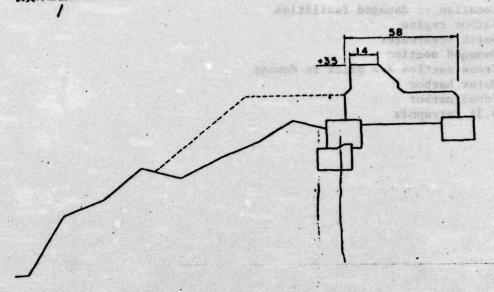
19. Ryotsu Harbor

Key:

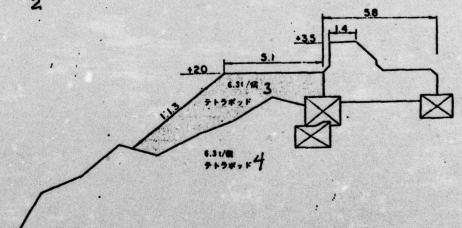
- 1. Location of damaged facilities
- 2. Harbor region
- 3. North breakwater
- 4. Damaged section
- 5. Cross section A-A prior to damage
- 6. Outer harbor
- 7. Inner harbor
- 8. 6.3t tetrapods

1. A + A 5 对南亚田克

被災時断面図(A-A)



復旧新函数(A-A) 名



19. Ryotsu Harbor

| | 1. | Restored cr | oss section | time of damage | | | | |
|--|----|--|---|--|--|---|---------------|---|
| | | | | | | | | Ė |
| | | | | | | | | |
| ALEGERATION AND AND AND AND AND AND AND AND AND AN | | | | · Charles | 1 2 1 | | | |
| | | | | | | | | |
| A STATE OF THE STA | | | | 1 | | | | |
| AND A MARK OF THE PARTY OF THE | | | | | | | | |
| | | | 25, 18° s | | | | | |
| | | | | | TALL TAR | | San- | |
| | | and the state of the state of the state of | | | | | | |
| | | | | | | | | |
| | | 22.8 * | 19 08 16 | 1 | | | | |
| | | | A SOTIA | 2× × | a K s | | | |
| | | Control of the State of the Sta | | the beautiful to the second of the second | production that the last production | A 7 | | |
| | | note: | Deres Sinsing (| | AND THE PARTY OF THE PARTY. | | | |
| | | report of the state of the stat | | | | | | |
| | | | The Market Control of the State of the Land | Control of the Contro | A TO THE WAR THE THE PARTY OF T | | | |
| 130.00 + 10 M of California 10 m of California | | | | * *** *** *** | to the planting of the first of the | | | |
| 45 9 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | | | | | Water St. Company | | | |
| | | terminal parties or floor and the party of the | | (157) | | B) | - I El Jacob | |
| | 60 | ather Autophysics Andropes | Bridge Michigan College And Land | Wall | Hamiltonia y continue o e | San | 相应 | |
| The grant De Lin 18 Th. Ref. 100 to the last of the la | | | 三次的一个大型的一个大型的 | | Marie Carlo Control of the Control o | _66 | in the Contra | |

20 柏 崎 港

| 地 | X 施 | 段名 | 2 10 83 | 放堤 | BM也 | 様式 48所打コン | クリート式提成場 | | | |
|-----|--------------|-----------|--------------------|------------------|-------------------------|-----------|---|--|--|--|
| 完成年 | F月日 | 6昭和 | 038年1 | 1月5日 | 7被炎年月日 8四和41年1 | 月19~20日 | 9(冬期展沒) | | | |
| * | の表 | #8 | 権力がよ | び被覆石散乱。 | 根菌プロック移動, 操体が // | | qua barca se equitar di e ngazzes se, c | | | |
| | 13 | 70 | 14, | 寸 15 株コンダート | 1 2.0 × 6.0 × 1 0.0 | | | | | |
| | 立 | פעב | ,,-+ | # 17 ts | | | | | | |
| 12 | | | | ф 18 ts | 1 - | 7 単位体数重量 | | | | |
| | | 上部場所打 | | ンクリート | 1:3:6 | | | | | |
| | 21 | | 7 6 | 500kg/60 | 23 | | | | | |
| 英 | 槍 | * | I | 卷外, 拾石 1. | 5 t/個 港内, 拾石 1. | 01/年25 | | | | |
| | 石 | 根圖 | 学,, 数. 2.5×1.5×2.5 | | | | | | | |
| | ** | 務被 | 3h. , 1 to L29 | | | | | | | |
| 10 | | M B | 9 E | 1 L29 | | | | | | |
| | 31 t | 0 | lta | ts L29 | | 1.7 | | | | |
| | _ | 32 | | ₩ 33 × | H 1/3 = 5.5 m | 被 34 压 | 本 明35 | | | |
| | - | | | 用 36 期 | 不明35 | 入37射 角 | β=5° | | | |
| | 20 | 温 | 提件 | 80+ ~ 1 | 2プロック最大 0.26m 4/ | | | | | |
| | 37 | 立 | 提件 | 42 M M | 1° 30′ | | | | | |
| 35 | 英 | - | 提件 | 東場の状況 | 巻外、延長100m、5,640m 権内なし 光 | | | | | |
| | | 21 | 被概 | 150 M & | | | | | | |
| | 散 | 75 | * # | 470 数 和 | | | <u> </u> | | | |
| 类 | 2 | | | 3900数数 | | | | | | |
| | | | Chromosophoeses | for a | - | | | | | |
| | | 31 | + | o (te | - 53 | | l | | | |
| 時 | 5 | 52 自然条件 数 | | <i>33</i> A | H 1/3 = 5.8 m (EM) | 用光明 | 不明35 | | | |
| | 自然 | | | 54 向 | NW | # E5 W | +0.82m | | | |
| | 1 | | - | 856時間 | 本 男 35. | ■ 57 ≥ | 学的 NW 19.7m/m 解析 NW 26.0m/m | | | |
| | \$9 18 35 | Œ. | | した場所はその した。 | ままにして前面に12.01/ | 曲 中空三角プロ: | ,夕乱般にて前放工 | | | |

20. Kashiwazaki Harbor

Key:

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Site placed concrete composite breakwater
- 5. Date completed
- 6. 5 Nov. 1963
- 7. Date damaged
- 8. 19-20 Jan. 1966
- 9. Winter season wind waves
- 10. Damage status
- 11. Foundation mound and overlay rocks dispersed; consolidation blocks were shifted with shift and drop of the levee body.
- 12. Prior to damage
- 13. Vertical part
- 14. Prepacked concrete
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Unit volume weight
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. Outside harbor riprap 1.5 t/piece, inside 1.0 t/piece
- 26. Consolidation blocks
- 27. Outside harbor
- 28. Precast concrete armor blocks
- 29. None
- 30. Wave dissipation riprap
- 31. Other
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Unknown
- 36. Period
- 37. Angle of incidence
- 38. At time of damage
- 39. Amount of damage
- 40. Levee body slide
- 41. 2 blocks a maximum of 0.26 m
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. Cracks dissecting levee body (prepacked, superstructure)
- 45. Dispersion of overlay

- 46. 100 m extension outside harbor, 5640 m³; inside none
- 47. Dispersion of foundation mound
- 48. 100 m extension outside harbor, 1378 m³
- 49. Dispersion of consolidation blocks
- 50. 40 extended 100 m
- 51. Dispersion of dissipation works
- 52. Natural conditions
- 53. Visual measurement
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Wind velocity
- 58. Average NW 19.7 m/sec; peak NW 26.0 m/sec
- 59. Method of restoration
- 60. Damaged site left untouched; wave dissipation works were made up of 12.0 t triangular block random rubble.

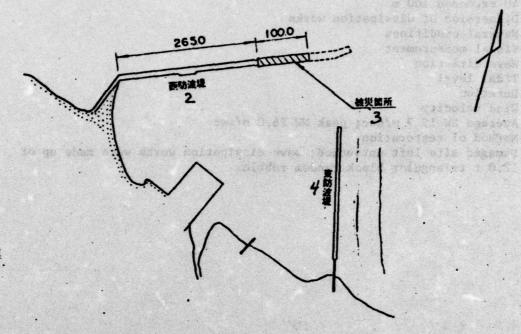
. Some a manufacture process and

AND DESCRIPTION OF THE

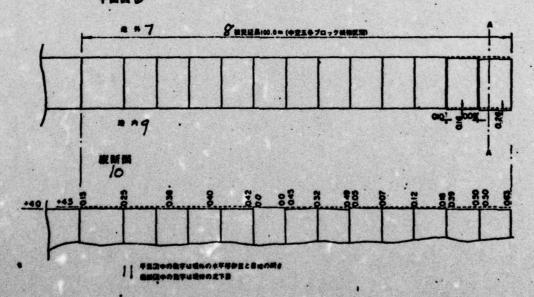
设度性

m 8781 , indred ablejus selection of Co.

被災施設位置問



後英電所平面および収断面 5



0.3

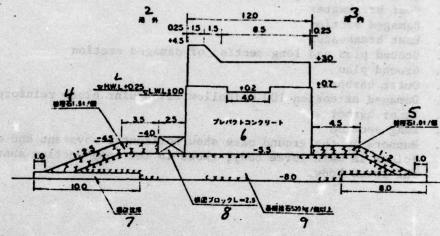
20. Kashiwazaki Harbor

Key:

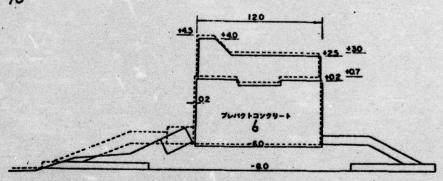
- 1. Location of damaged facilities
- 2. West breakwater
- 3. Damaged section
- 4. East breakwater
- 5. Ground plan and long section of damaged section
- 6. Ground plan
- 7. Outer harbor
- 8. Damaged extension 100 m (Hollow triangular block reinforced sector)
- 9. Inner harbor
- 10. Long section
- 11. Numbers in the ground plan show horizontal movement and openings of joints in main levee body; those in the long section show settling of the levee body.

A-A-12数数额数

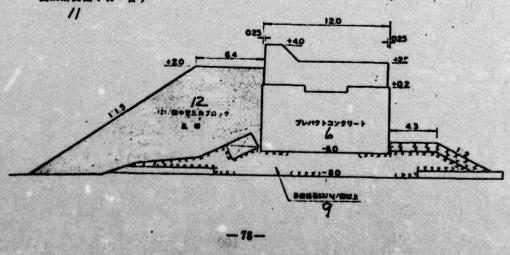
· 被災的断面図(A—A)



被災時断面図(A-A) 10



復旧新寅四 (A-A)



20. Kashiwazaki Harbor

但是母母S A 数 图 A 为。

力或器機

被医维西

Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. 1.5 t overlay
- 5. 1.0 t overlay
- 6. Prepacked concrete
- 7. Ma.
- 8. Consolidation blocks
- 9. Foundation mound (more than 500 kg)
- 10. Cross section A-A at time of damage
- 11. Restored cross section A-A
- 12. 12 t hollow triangular block rubble

ANEN

THE RESIDENCE OF

SERVICE SERVICE

128 4

More and the state of the second

and contain the first harvest all an entire and

The end of the second s

\$2.5.660、1.600、1.600、1.600、1.600、1.600。

25 to 1 10 22 m

CONTRACTOR OF THE STATE OF

| | 区施 | 1 | | | | 構造様式 4ケーソン | | | |
|-----|-------------------------|-------------------|------------------|---|--|---------------|-----------------------|--|--|
| 完成年 | 年月日 | 683 | 843年1 | 2月4日 | 7数災年月日 B昭和 4 5 | 年1月31日 | 9(低気圧) | | |
| 被状 | が元 | 被包 | 夏石が 散乱 | .し、先機より3 | 画のケーソンが移動化 / | 下して、うち1畝は旬 | 態態に破損を生じた。 | | |
| | 13 直 | | | 寸 15 株 | B H L 1 5.0 × 7.5 × 1 5.0 | | Island 3 Dyl | | |
| | 立 | 1 | 14 | コンタート | σ ₂₆ = 2 4 5 kg/cd | 2 22 20 22 22 | CIECUS CONTRACTOR | | |
| 层 | | | | 政 17 筋 | | D30 | CELE SELECT | | |
| 被 | 部 | 上部場所打 | | 中 18 結 | 19 | 単位体積重量 | 2.0 t/m³. | | |
| | 1 | | 新州13 | | $\sigma_{28} = 1.6 \text{ Okg/cm}$ | s resugner in | police a Si | | |
| 炎 | 21 拾 | | 24 I | | 2 0 0 kg/伽L3 | | | | |
| ^ | 75 | 被 被 想 | | 機外内とも拾石 2.0 t/個 2.5 機外内と B H L たり内と 2.5×1.5×2.5 | | | | | |
| | | Carlot A Children | 30,0 | te 129 | 2.5 × 1.5 × 2.5 | | | | |
| 前 | 部 | | P _持 石 | ts L29 | | | | | |
| | 3/ + | 0 | | 先端巻止(12.5 t/個テトラポッド)32_ | | | | | |
| | | 33 股計資料 | | 故 34 高 | H 1/3 = 5.5 m | ₩ 35 E | 种故36 | | |
| | 改 | ar ya | 种 | 岡 37 明 | 1 3 sec | 入38射 角 | β = 0° | | |
| | 1/0 | | | 別すべり | 3 10.5 2 m ~ 8.7 m | | | | |
| | 粉 | | | 好 解 解 | 1° 30′ | | | | |
| 39 | 災 | 部 | | 被似の状況 | ケーソン破損 1番 (| 45 | | | |
| | | 2/ 推 | | 160 k & | 卷外, 延長52.0m, | 2.252㎡ 港戸 | 4. te 147 | | |
| | 数 | | | 村の 散乱 | te L29 | | | | |
| 炎 | • | | 部 根間ブ | 4900数乱 | 港外, 延長5~10m. 2. 侧 港内, 延長2~10m. 6個≤ | | | | |
| | | | 消波 | 10 数 乱 | - | | | | |
| | | 3/ | | D (16) | 先総巻止用 1 2.5 t/1 | | | | |
| 時 | STORY STATE OF ALL SAND | 53 放 放 放 | | 34 A | 7. 9 m | 周 37 期 | 1 4.1 sec | | |
| | 自然 | | | 54 向 | WNW | 柳 55 位 | | | |
| | | | | 时 的 | 不明57 . | 图 58 速 | 1 01100 00.2110 200 7 | | |
| 復 1 | 60 市 | 扶 | 付し. て港外 | 側壁の破損した | R. 設計波高は6.5 mと た1 mは中話を抜きとり /個 テトラポッドにて消 61 | プレパクトで光熉。 | さらに全延長に亘っ | | |

21. Himekawa Harbor

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 4 Dec. 1968
- 7. Date damaged
- 8. 31 Jan. 1970
- 9. Low pressure
- 10. Damage status
- 11. Overlay dispersed; 3 caissons shifted and fell from the cusp and one of them was damaged on sidewall.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. F111
- 19. Sand. Unit volume weight 2.0 t/m³.
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. Riprap 2.0 t/piece inside and outside harbor
- 26. Consolidation blocks
- 27. Inside and outside harbor
- 28. Precast concrete armor units
- 29. None
- 30. Wave dissipation riprap
- 31. Other
- 32. Cusp engulfed (12.5 t tetrapods)
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 3 caissons
- 43. Levee body slope
- 66. Condition of levee body damage
- is. I cateson denaged

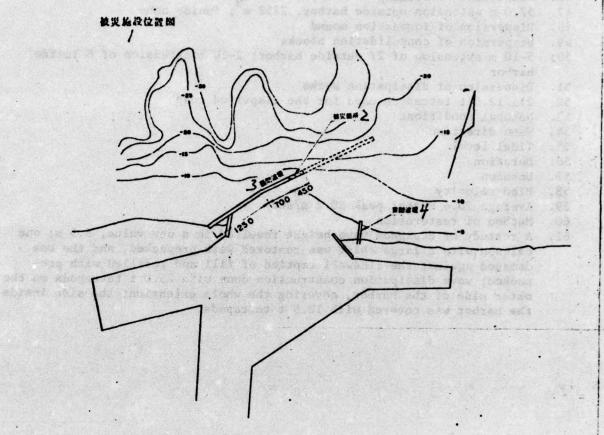
46. Dispersion of overlay

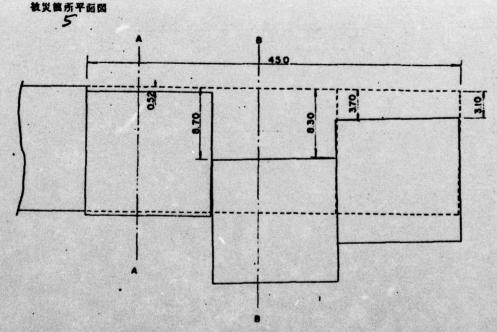
47. 52.0 m extension outside harbor, 2252 m3; inside none

48. Dispersion of foundation mound

49. Dispersion of consolidation blocks

- 50. 5-10 m extension of 27 outside harbor; 2-10 m extension of 6 inside harbor
- 51. Dispersion of dissipation works
- 52. 211 12.5 t tetrapods used for the dispersed cusp
- 53. Natural conditions
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Unknown
- 58. Wind velocity
- 59. Average 20.6 m/sec; peak 30.2 m/sec.
- 60. Method of restoration
- 61. A restudy of designed wave height resulted in a new value, 6.5 m; one caisson with a large shift was restored with prepacked, and the one damaged against the sidewall emptied of fill and refilled with prepacked; wave dissipation construction done with 25.0 t tetrapods on the outer side of the harbor, covering the whole extension; the side inside the harbor was covered with 12.5 t tetrapods.





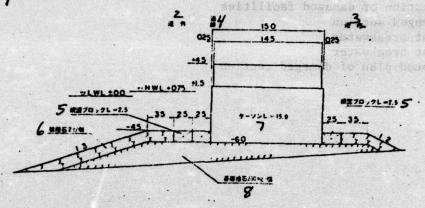
21. Himekawa Harbor

Key:

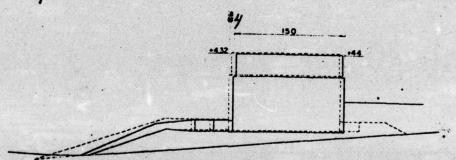
- 1. Location of damaged facilities
- 2. Damaged section
- 3. West breakwater
- 4. East breakwater
- 5. Ground plan of damaged section

ta k/2benu

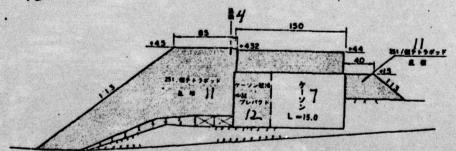
被災的新面図



被災時断面図(A - A)



復旧新選四(A -A)

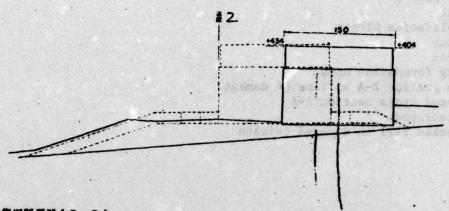


21. Himekawa Harbor

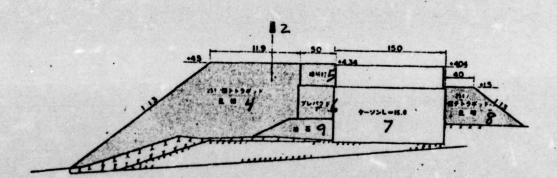
- 1. Cross section prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Normal
- 5. Consolidation blocks
- 6. Overlay
- 7. Caisson
- 8. 200 kg foundation mound
- 9. Cross section A-A at time of damage
- 10. Restored cross section A-A
- 11. 25t tetrapods
- 12. Prepacked fill in damaged caisson

② 姫 川 港

被災時断而図(B-B)



復旧新面別(B-B) 3



201

21. Himekawa Harbor

Key:

- 1. Cross section B-B at time of damage
- 2. Normal
- 3. Restored cross section B-B
- 4. 25t tetrapod rubble
- 5. Concreting in site
- 6. Prepacked
- 7. Caisson
- 8. 25t tetrapod rubble
- 9. Riprap

TO A THE THE TENTON AND THE TENTON OF THE TE

多 张 助 胸

(SI) and SISSING

DEMANDE OF THE SELECTION OF THE PROPERTY OF TH

| | | T | | 崎鎮 1 防被装 | | 構造様式 4ブロ | | | | _ |
|--------|------------|-------------------------------|---------|-------------------|--|--------------------|-----|----------------------------|--------------|-------|
| 完成年 | 手月日 | - | 28~3 | | 7被災年月日 8 四和 4 7 | 3217 | | | 気圧 | |
| 数 10 元 | | 延長87.8mだ亘り、中段プロリート破壊散乱60m電製30 | | | | et indone. Mili | | euro de Acquas Lanta | 7932 23 7 | |
| | 13 | | | + 15 t | B H L 3.14×1.7×2.6 | 119 | | A CONTRACTOR | 98 k 11 | 9 |
| | ± | 7079 | | B 18 1 | 1 8 6 kg/m² SR 2 | 4 | | | geria. | |
| 12 | | | | + 19 B | | | | | | |
| | | 1.65 | # Mi 17 | 0-99-1 | 本 917 | | | | | |
| | 21 | | m22 | 200kg/8 | 123 | 11 | 365 | | | 1111 |
| | * | × | e 44: | 卷外. 接石 | 60 0kg/18 25 | | | | | |
| | 5 | 製機 | ,24, | ₩N. 27 | H L X1.4 X 2.2 | B H L | | | | |
| | | 無故 | ,41, | t L30 | | | | | | |
| | | M R 4/5 | | # L30 | | | | 7 | | |
| | 32+ | 0 | 4 | # L30 | | | | | | |
| | | 33 | | # 34 F | H 1/3~4.5m | # 35 | - | * #. | 8 | |
| | 1.51 | | | M 37 1 | 1 1.0 arc | A38M | A | 1=0. | | |
| | - | # # | | 8' + ~ | 5 + < 1 2 L 20 | | | | | |
| 20 | × | 2. | * * | U2 44 1 | M & L30 | | | | | |
| 7 | | - | 42 # | 45 | | 上の仮張取れら | 4 | | | |
| | | 2/ | | To R | 1 2 1 30 | | - | | | |
| | ١. | 5 | M. M. | 470 M St. 12 L 30 | | | | | | |
| | | | | 480 a | | | | | | |
| | | 32 t 0 M | | | | | | | | |
| | | 49 数 | | 34 = | H 1/3=5~6m(E | R m 37 | 10) | 不明 | 17 | |
| | | | | 51 m | | | | 不明 | | |
| | | | | 823 AN 110 | 20 h | ■ 54 | × | 平均 NNI PAL NNI | 2551 | n/sec |
| 被 | 56 旧方 | 推 | 後旧 | する。又、飛 | は据え直し、上段ブロック 散ブロックを収りこわしたコン の希波工を施工した。 5 | ノクリートを中語 | | クリート | は原形(| ıc |

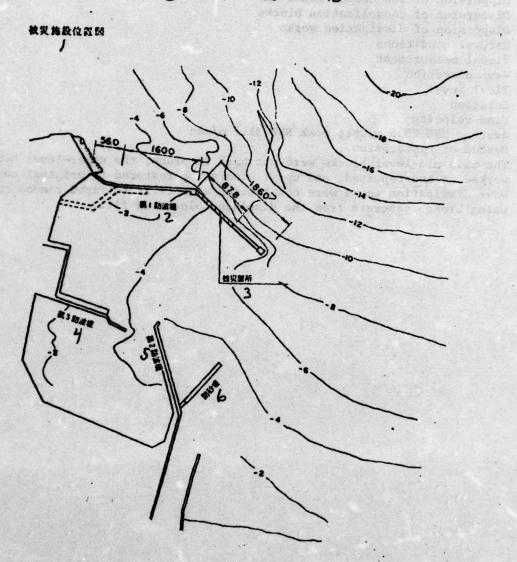
22. Wajima Harbor

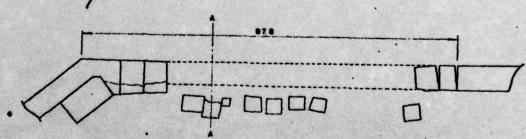
- 1. Regional facility name
- 2. Wajima breakwater no. 1
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 1953-1964
- 7. Date damaged
- 8. 1-2 Feb. 1972
- 9. Low pressure
- 10. Damage status
- 11. About 20 mid-level blocks shifted, an extension of 87.8 m; 120 upper level blocks shifted; 60 m of concrete in superstructure destroyed and dispersed, 30.3 m of cracks
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Concrete
- 17. Unknown
- 18. Reinforcing steel
- 19. F111
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. Outside harbor, 600 kg riprap
- 26. Consolidation blocks
- 27. Outside harbor
- 28. Inside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. The main blocks and superstructure destroyed and dispersed
- 45. Dispersion of overlay

- 46. Dispersion of foundation mound
- 47. Dispersion of consolidation blocks
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Visual measurement
- 51. Wave direction
- 52. Tidal level
- 53. Duration
- 54. Wind velocity
- 55. Average NNE 25.5 m/sec; peak NNE 31.2 m/sec
- 56. Method of restoration
- 57. The main mid-level blocks were put back in place, the upper-level blocks worked on and repaired, and upper concreting restored to original condition. Wave dissipation works were constructed with 12.5t tetrapod random rubble, using broken concrete from the displaced blocks as fill.

特別所與數學因為

被災施設位置因

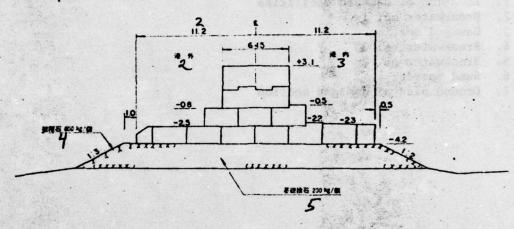




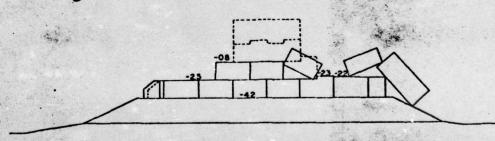
22. Wajima Harbor

- 1. Location of damaged facilities
- 2. Breakwater no. 1
- 3. Damaged section
- 4. Breakwater no. 3
- 5. Breakwater no. 2
- 6. Sand barrier
- 7. Ground plan of damaged section

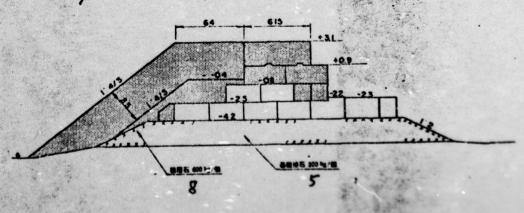
被災前断面間(A-A)



被災時断面図(A-A)



復旧断面図(A-A) フ

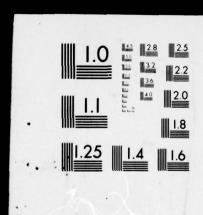


PORT AND HARBOUR RESEARCH INST TOKYO (JAPAN)
DISASTERS OF REAKWATERS BY ILVE ACTION (2).(U)
MAR 75 H TAKEYAMA, T NANAYA.4A
TN-200

ACSI-K6472

NL

3 OF 6 AD AD A036006



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUNEAU OF STANDARDS 1963 \$

Key:

- Cross section A-A prior to damage
- Outer harbor
- Inner harbor
- Overlay
- 5. Foundation mound
- Cross section A-A at time of damage
- Restored cross section A-A 7.

- Overlay
- Foundation mound

。18 36 B T S 图 D T S E T Y A A C T Y A A C T Y A B C T

Season of Brilland

THE SALE AND THE PERSON AND AND AND A SECOND OF

THE RESIDENCE OF THE PARTY OF THE PARTY OF

To resembly the terms of the transfer of the A 4、1760年10、11.00至1000日,10000日,10000日,10000日,1000日

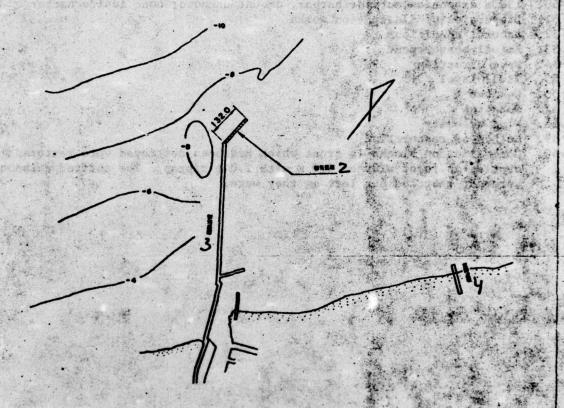
| 地区 | 电段 4 | 2 75 | 方被堤 | | ま大 4ケーソン | |
|--|------------------|--------------|----------------------|---------------------------|--|------------------------|
| 完成年月 | B 65 | エ中 | | Y被災年月日 8昭和 4 3年 1 | 月14~16日 | 9(低気圧) |
| 10 | | | 縦され、被仮石が 大約80cm移動 | が散乱し根固プロックが移動 した。 // | した。 きらに上1 | 応工未施工のケーソ |
| 1 | 3 | | 寸 15 株 | B H L 15.0×5.5×12.0 保禁 | 0.35 縣幾 0.2 | 唯# 0.5 /6 |
| | | 14, | コンパート | 626 = 2 4 0 kg/cm | Tradition to | enagh. In ires |
| | 2 7 | - , , | 数 18 新 | 64kg/m² SD35 | | 7 7 7 7 7 |
| 4 | B | | + 19 # | 2 0 · | 學位体務重量 | 201/1 |
| | Ŀ | B場所 打 | ンクリート | sa = 1 6 0 kg/cml | | W. F. 35 |
| 2 | 2 = | 27 石 | 25 0kg/@2 | 4 | | |
| 英 1 | * | ¥ I | | 石1.01/值26 | | |
| 1 | 5 概 | 到多了,, | 地外。3.0×1 | 5×4.0 | H L < 1.5 × 3.0 | |
| 1 | B #1 | 38., | te 131 | | | . 180 |
| 10 | · m | 设备 石 | te 131 | | | |
| 32 | 34 0 | 他 | * 13/ | | • | |
| | 农州黄料 | | 表 35 × | H 1/3=6m | ₩ 36 E | 种 被37 |
| | | | M 38 M | 1 1.0eec | A MPCK | β=25° |
| | | 提件 | 84 ~ 1 | 11篇,最大0.78m 43 | | 100 |
| 40 | | 10 A | 世 | * 131 | | 1 |
| A STATE OF THE PARTY OF THE PAR | | 提件 | 数分状況 | 2 14 | | 1 1.074 |
| | 2 | 2 2 4 | I'S R R | 卷外, 延長130m, 数量 | 个 明 · 10 · 10 · 10 · 10 · 10 · 10 · 10 · | 技災あり、数量不明 リ |
| 2.1 | 8 | 3 8 | 5'0 R R | な しょ) 着外, 延長130m, 数量 | TS 80 1 | 11 50 |
| # 1 | - 4 | 表面方 | - 57 の数型 | | THE THE PARTY OF | 90 |
| | 1 29 | m & | TO H A | | | * Cross & |
| | 122 | No Medical | 35" # | H1/3=4.0m(美術) | M 38 M | 9-4-5 |
| | 52 | | 54 # | W | m 55 W | |
| | DM SRIT | ** | \$7 m m | 5h | # 58 # | |
| • | | 80 | | プロックを復旧し、前面の装 | | Company of the Company |
| 2 E | ⁷ , a | | | ケーソンは出来形とし製旧し | | |

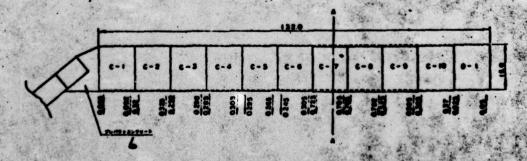
23. Kanazawa Harbor

- Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 14-16 Jan. 1968
- 9. Low pressure
- 10. Damage status
- 11. Front normal scoured, overlay rocks dispersed, and consolidation blocks shifted. Further, caissons of the unfinished superstructure shifted a maximum of 80 cm toward inner side.
- 12. Prior to damage
- 13. Vertical part
- Caissons 14.
- 15. Dimensions
- Sidewall 0.35, compartment wall 0.2, base plate 0.5 16.
- 17.
- 18. Reinforcing steel
- 19. F111
- 20. Sand. Unit volume weight 2.0t/m³.
- Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Riprap 1.0t/piece inside and outside harbor
- Consolidation blocks 27.
- 28. Outside harbor
- 29. Inside harbor
- 30. Precase concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage 41. Amount of damage
- 42. Levee body slide
- 43. 11 caissons, maximum 0.78 m
- 44. Levee body slope
- 45. Condition of levee body damage

- 46. Dispersion of overlay
- 47. 130 m extension outside harbor, amount unknown; damage inside harbor, amount unknown.
- 48. Dispersion of foundation mound
- 49. Dispersion of consolidation blocks
- 50. 130 m extension outside harbor, amount unknown; none inside harbor.
- 51. Dispersion of dissipation works
- 52. Natural conditions
- 53. Actual measurement
- 54. Wave direction
- 55. Tidal level
- 56. Unknown
- 57. Duration
- 58. Wind velocity
- 59. Method of restoration
- 60. Consolidation blocks in front which had been destroyed were restored; overlay in front widened 4.0 m with 1.0 t riprap. The shifted caissons were not restored but left as they were.

被災施設位置問





23. Kanazawa Harbor

《2004年5日为2004年

CALATER MER

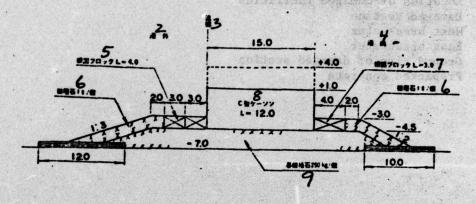
《本台文》第7章是第一。

Key:

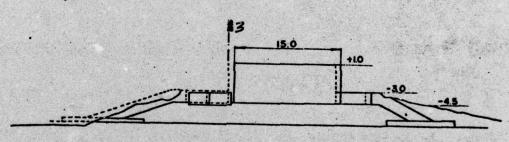
- 1. Location of damaged facilities
- 2. Damaged section
- 3. West breakwater
- 4. East breakwater
- 5. Ground plan of damaged section
- 6. Prepacked concrete

· 张 \$15 (14) (15) \$1

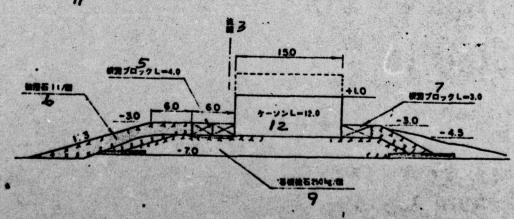
後災前断而図(A-A) /



後災時断面図(A-A) /O



複形新面の(A-A)



23. Kanazawa Harbor

NEEDERLE CENTER OF THE PARTY OF

an traite as a

1000000

(新·波·斯·斯·

note seed the man of the man

\$41.66种产业等产生多级企业联合中的5

was an including when the

Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Normal
- 4. Inner harbor
- 5. Consolidation blocks
- 6. Overlay
- 7. Consolidation blocks
- 8. C-type caisson
- 9. Foundation mound
- 10. Cross section A-A at time of damage
- 11. Restored cross section A-A

DINE FR HOME

学 观景 熟证

12. Caisson

Standard and the Control of the Standard Control of th

| /地 | 区施 | T | | 地区東防夜堤 | | B構造様式 4ケーソン | 大混成处 . | | |
|-----|-----------|--------------|----------------|----------------------------|---|--|-------------------------|--|--|
| 完成年 | 年月日 | 685 | I 中 | | P被炎年月日 B阳和 4 | 2年10月28日 | 9(台展34号) | | |
| 枚状 | 10 英 | 被包 | 【石の法別 | 部分が散乱し、 | 上部工未施工のケーソ // | ン12函が最大90cm | 港内側に移動した。 - | | |
| | 13 | | | 寸 15 佳 | B H L 6.0×4.5×10.0 | 何壁 0.3 隔壁 0.2 | 建整0.5 /6 | | |
| | | 4- | 14 | コンタフリート | $\sigma_{26} = 2 \cdot 1 \cdot 0 \text{kg/cm}$ | wano leh n | mediale, Popular | | |
| 12 | 文 | | | # 18 B | 7 5.3 kg/m² | SD 3 0 | the south testines (the | | |
| 及 | #5 | | | 中 19 档 | 3 20 | 単位体積重量 | 2.0 1/1 | | |
| | | 上部 | 場所打 | トンタリート | e ₂₀ = 1 8 0 kg/cm² | | in income kero | | |
| | 22 | * 6 | 23 石 | . 50~100kg | /位24 | | | | |
| 类 | 7.0 | 被 | ¥ I | 差外, 拾石3 | | | | | |
| | 石. | | 好,, | 是外,2.0×1 | H L .0×2.5 | | | | |
| | 45 | 州政弘,1 | | t L30 | | | | | |
| 前 | | 前首 | 经验证 | t 130 | | | | | |
| | 32+ | 32 そ の 他 な し | | | 30 | | | | |
| | | 33 股份资料 | | 数 34 万 | H 1/3 = 2.5 m | ₩ 35 E | 砂兹 36 | | |
| | | | | 用 37 期 | 7. 3 sec | 738射 为 | 8-10 | | |
| | 140 | | | ガ → ベ り 1 2職 0.1 m ~ 0.9 m | | | | | |
| 20 | 100 | 部 | 提体 | 72 4 4 | * L30 | | | | |
| 39 | * | | 提体 | 教養の状況 | n 130 | | | | |
| | | 72 | 被极 | Pons | 延長. 150m, 21 | 0# | | | |
| | 散 | | * 0 | 古の数品 | te 130 | | | | |
| 更 | | | | がくりの敗乱 多少の移動 49 | | | | | |
| | | | | To a a | | | | | |
| | - | 32 | t | o (t) | - | <u> </u> | | | |
| * | | 51 故 | | 34 = | H max = 2.5 m (Ha | STATE STATE OF THE | 不 明53 | | |
| | 自然 | | | 54 M | ENE | M 55 W | +0.8 m | | |
| | 1000 | | * | m26m m | 86 | 里 57 差 | PALENE 34m/se | | |
| | 59 B # | | | | またして未施工だった。 各内側に新たに3001 60 | | | | |

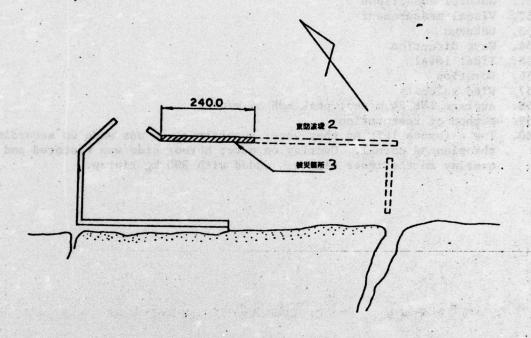
24. Aomori Harbor

- 1. Regional facility name
- 2. Aburakawa district east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 28 Oct. 1967
- 9. Typhoon No. 34
- 10. Damage status
- 11. The normal shoulder part of riprap was scattered and 12 upper unfinished caissons shifted 90 cm toward inner harbor side.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.3, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Sand. Unit volume weight 2.0 t/m3.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Riprap 300 kg/piece outside harbor
- 27. Consolidation blocks
- 28. Outside harbor
- 29. Precast concrete armor units
- .30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Leves body slide
- 42. 12 caissons 0.1-0.9 m
- 43. Levee body slope
- 44. Condition of levee body damage
- 45. Dispersion of overlay

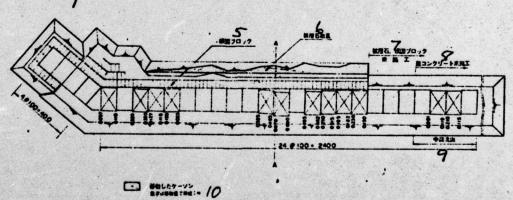
- 46. 150 m extension, 210 m³
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. More or less shifted
- 50. Dispersion of dissipation works
- 51. Natural conditions
- 52. Visual measurement
- 53. Unknown
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Wind velocity
- 58. Average ENE 24 m/sec; peak ENE 34 m/sec.
- 59. Method of restoration
- 60. The caissons left as they were; superstructure was made up according to the planned normal. Overlay on outer harbor side was restored and more overlay on the inner side was added with 300 kg riprap.

become malautem a leader grade exceld mertebasempts to operate action holdles feet as execexten methodology to other con-

被災施設位置図



被災箇所平面図 *山*



24. Aomori Harbor

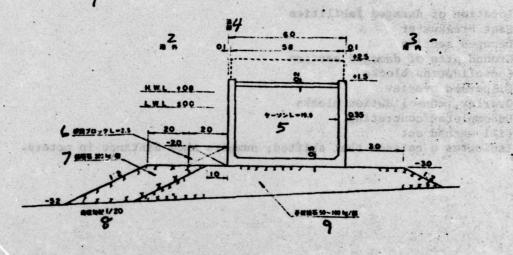
Key:

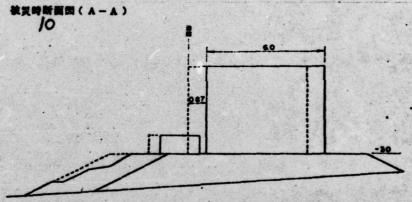
- 1. Location of damaged facilities
- 2. East breakwater
- 3. Damaged section
- 4. Ground plan of damaged section
 5. Consolidation blocks
 6. Dispersed overlay

- 7. Overlay, consolidation blocks
- 8. Uncompleted concreting
- 9. Fill washed out
- 10. Indicates a caisson that shifted; numbers show distance in meters.

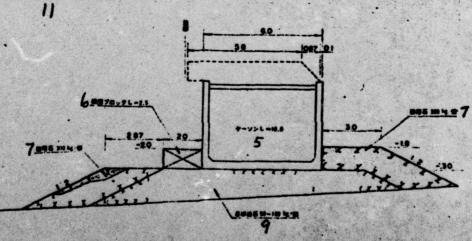
经基本基金的影响联通

被災前断面閃(A-A)





復旧新国関(A-A)



24. Aomori Harbor

知识的别 条 市 各 名 题《

- PARKERS AND TO

Cross section A-A prior to damage

BULLY - Hyper

the and the form of the first of the and the

BENTAL BE SE BE THE MAN SERVICE

WALET I TERRESON WOOD TRANS CHANGE WAS AND

401 P (25) PA

Tales so a 50 u

- Outer harbor
- Inner harbor
- Normal
- Caisson The County Property of the State of
- Consolidation blocks
- Overlay
- 8. Ocean floor slope 1/20

- 9. Foundation mound
- Cross section A-A at time of damage 10.
- Restored cross section A-A

THE SECRETARY SERVICE CONTRACTOR OF A SECOND

经工作的 沙 湖土

ter who is company

以 中 本 1 · 10 申代 6

25 尻屋岬港

| /地区施設名 255 | | 255 8 | 皮幔 | BAZ | 造様式 4ケーソン式程成幾 | | | | |
|------------|------------|----------|--|------------------------|---|---|------------------------------------|--------------------|--|
| 完成年月日 | | 6昭和38年 | | | 被災年月日 昭和 4 2年 9 月 2 1 ~ 2 2 日 9(台版 2 7号) | | | | |
| 被状 | り元 | 7- | - ソンが視 | 的例へ0.57m | ~0.87m移動した。 // | odro AM | notife , 5 kts tich | sa tepy a | |
| | 13 | 7 | | ★ 15 # | | 数0.3 隔壁0.5 | 25 底盤(| 14516 | |
| | 立 | | 14,, | ו-16עב | 不明18 | | | 4.00 | |
| 12 | - | | | # 19 5 | 不明/8 | 10 11 5q5 | LB TOD: | li depo | |
| 被 | # | - | 2.2 | 4 20 H | ₩ 21 | 単位体验量 | 本 | Table? | |
| | - | 上部 | 場所打ち | ンクリート | 不明18 | 41 | Terms of a | ENTERNA DE LA COMP | |
| | 23 | # N 1 6 | | 不明彤 | | 11 | | | |
| 英 | | 教 | 教 1 なし26 | | | ! . | | 1 34 34 4 | |
| | 8 | Balanta | 37., | * 126 | | | | | |
| | # | 商 数据 石 | | # 126 | | 1.000 | | | |
| | | | | # 126 | | | | | |
| | 30× | 30+ 0 M | | te 126 | I | Ten | | yen a | |
| | 数件数料 | | ₩ 32 W | H 0 = 4.0 m | + | \neg | £ 34 | | |
| | | 12 | | M 35 M | 7. 3 sec | 148 H | β β = · | 4 5* | |
| | 38 | - | | 30 ナベ り 2番. 最大0.87m y0 | | | | | |
| 37 | 被 | 立 | 提 体 | 70 株料 | 2 626 | | | • | |
| 37 | 类 | | 提件 | 13 | ts. 121 | | 14 28 11 | | |
| | | 23 章 | 被费 | 10枚制 | | | | | |
| | | | No. of Concession, Name of Street, or other Publisher, or other Publisher, Name of Street, or other Publisher, or other Publisher, Name of Street, or other Publisher, or other Publisher, Name of Street, or other Publisher, or other Publisher, Name of Street, or other Publisher, Nam | 10 K & | 12 626 | | Tare to the last | | |
| 类 | - | | 概数プ | お、,onta Wonta | 7 | | | | |
| | | 7. | 刑長 | | <u> </u> | | | | |
| | | 47 R | | | H1/3=4.5=(日間) | | - X | 812 | |
| | 4 | | | 32 × | NW : | M 35 | THE RESERVE OF THE PERSON NAMED IN | | |
| | | | | 不明/8 | # 50 | | 19.0m/sec 53 | | |
| | | | | | | | | | |
| a 1 | 54 B 75 | # | 71 | ラボッド風積につ | そのままで、海外側に200 C前波工を始した。(この値 G被災を受けた。) <i>55</i> | | | | |

25. Shiriyamisaki Harbor

- 1. Regional facility name
- 2. Breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1963
- 7. Date damaged
- 8. 21-22 Sept. 1967
- 9. Typhoon No. 27
- 10. Damage status
- 11. Caissons shifted 0.57-0.87 m toward inside of harbor
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.3, compartment wall 0.25, base plate 0.45
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Overlay
- 26. None
- 27. Consolidation blocks
- 28. Precast concrete armor units
- 29. Wave dissipation riprap
- 30. Other
- .31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Clapotis
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. 2 caissons, maximum 0.87 m
- 41. Levee body slope
- 42. Consition of levee body damage
- 43. Dispersion of overlay
- 44. Dispersion of foundation mound
- 45. Dispersion of consolidation blocks

- 46. Dispersion of dissipation works
- 47. Natural conditions
- 48. Visual measurement
- 49. Wind direction
- 50. Tidal level
- 51. Duration
- 52. Wind velocity

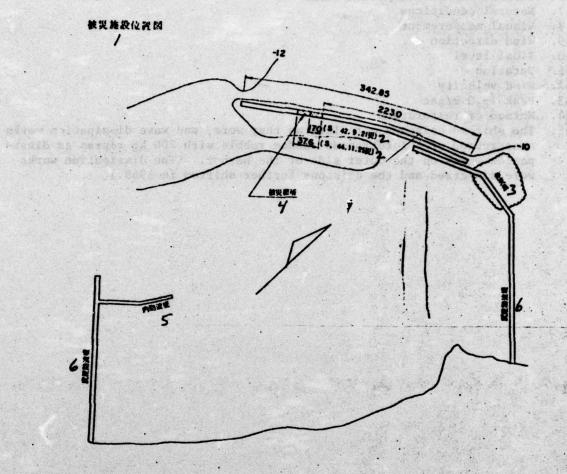
舌 编

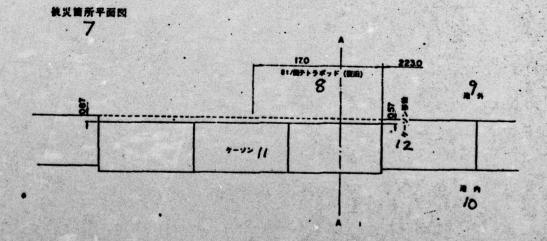
- 53. Peak 19.0 m/sec
- 54. Method of restoration
- 55. The shifted caissons were left as they were, and wave dissipation works constructed of 8 t tetrapods random rubble with 200 kg riprap as dissipation works on the outer side of the harbor. (The dissipation works were dispersed and the caissons further shifted in 1969.)

物以自觉良好量

為在分析核果是

min Bill rama





25. Shiriyamisaki Harbor

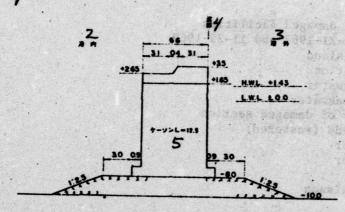
2.3 - A A 阿拉斯森罗德

UA-A 1. 用型型及影像。

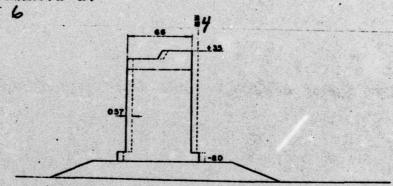
"一个人工工工作的新兴和

- 1. Location of damaged facilities
- 2. Damage of 9-21-1967 and 11-25-1969
- 3. Benzaiten Island
- 4. Damaged section
- 5. Inner breakwater
- 6. Shiriya breakwater
- 7. Ground plan of damaged section
- 8. 8t tetrapods (restored)
- 9. Outer harbor
- 10. Inner harbor
- 11. Caisson
- 12. Shift of caisson

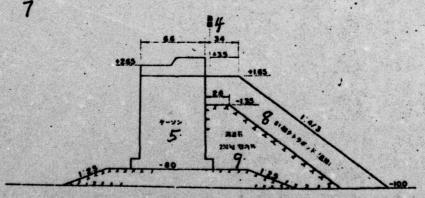
被災前断面図(A-A)



被災時断面図(A-A)



復旧新蔵図(A-A) 7



25. Shiriyamisaki Harbor

才是是我的问题如果也是我的问题。

Children and a september 14 miles 1

(工事在主) 网络新沙布灵姓 五

3. 其一年) 傳播物類分於

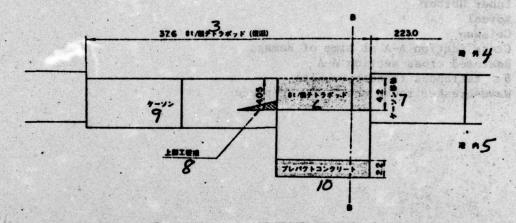
下多一年 人的通信证明

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Normal
- 5. Caisson
- 6. Cross section A-A at time of damage
- 7. Restored cross section A-A
- 8. 8t tetrapods (random rubble)
- 9. Wave-breaker rocks about 200 kg/piece

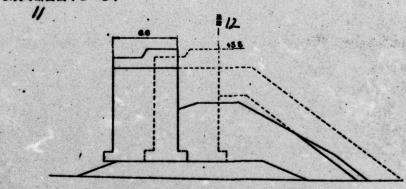
25 尻 屋 岬 港

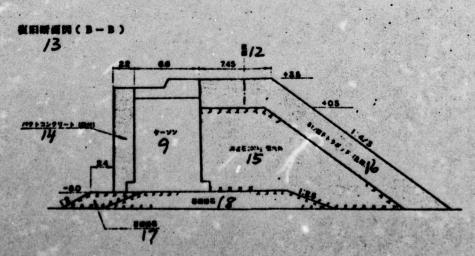
前記復旧箇所が44年11月25日に以下の被災を受けた。 (自然条件:波商日/5-6.0 m目間) Ten e de la la la coma de de la coma de la c

2 被災負所平面関(44年災)



被災時所面側(B-B)





25. Shiriyamisaki Harbor

Key:

The earlier restored section was damaged again on 11-25-1969; (natural conditions: wave height H 1/3 = 6.0 m, visual).

PART OF THE PARTY OF THE PARTY

BROKER

Approximation of the second

经验验

明明以外中国的 医一种 直 图 中心

2. Ground plan of damaged section (1969)

例如100年127 - 文工大批政从

- 3. 8t tetrapods (restored)
- 4. Outer harbor
- 5. Inner harbor
- 6. 8t tetrapods
- 7. Caisson shift
- 8. Superstructure damage
- 9. Caisson
- 10. Prepacked concrete
- 11. Cross section B-B at time of damage

Canala a Marian a realist from the belief of the first and the first the fir

かった後、後年プログラン・マントを開発して「大きませる」からいっても、1歳後

El Montaceau El Montaceau

· 由京丁》中华江 日十二品

發展等

205

点点 "然以无限女子中的公司的独立公司。"

- 12. Normal
- 13. Restored cross section B-B

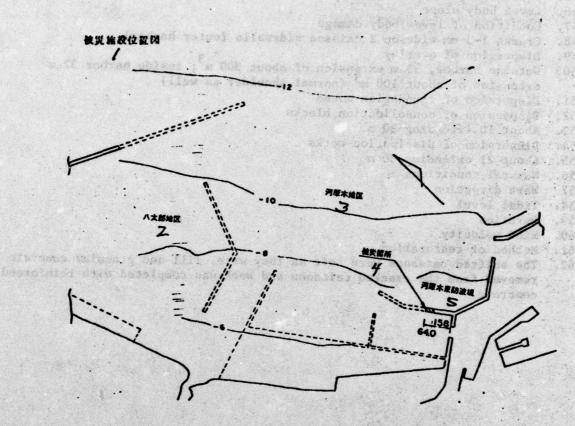
OF ROAD STATE OF SELECTION OF S

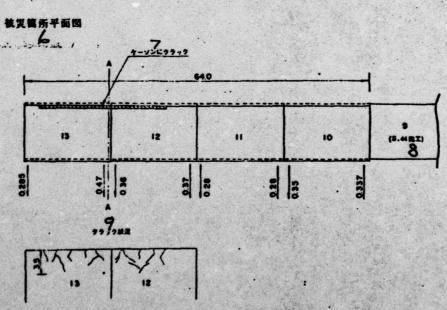
- 14. Packed cement
- 15. Wave-breaker rocks about 200 kg
- 16. 8t tetrapods (random rubble)
- 17. Foundation mound
- 18. Foundation mound

| | | | | 東防彼堤 | , | 構造様式リケーソン | | | |
|-------|------------|-----------|------------|--------------------------|----------------------------------|--------------------|--------------|--|--|
| 200.5 | 平月日 | MI | | COLUMN T | 被災年月日 日 4 5 | | 9(台風 2号.) | | |
| 被10 规 | | | | | 波工』部施工の状態でケ じ、被優石をよび』部が // | | | | |
| | 13 | | | 寸 /5 株 | B H L 10.5×8.0×16.0 | 何壁 0.4 隔壁 0.2 | 底盤 0.5/6 | | |
| | | 14 | | コンタリート | 028 = 2 4 0 kg/cm | nuagen ice | | | |
| | 立 | | | 鉄 18 15 9 4 kg/m² SD 3 0 | | | | | |
| 社被 | 都 | | | 中 /9 档 | # 20 | 學位件積重量 | 1.5 6 七/紀一空中 | | |
| | | 上部場 | 所針与 | ンクリート | 未施工(σ ₂₀ =180kg | (d) 22 | | | |
| | 23 | * 4 | 春 石 | 200~300 | kg/@25 | 3. 10. 10. 10. 10. | omeso become | | |
| 英 | 捨 | 被 後 I | | 着外内とも 拾石1.0 t/銀 27 | | | | | |
| | 75 | 极固多 | 8,, | 考内· 2.5×1 | R L | | | | |
| | #5 | 前故30.0 | | 12.5 t/個テトラボッド整教(1部施工 2) | | | | | |
| 前 | - | 州 截2 | 雅 石 | 1.0 1/個(1 | 部施工)33 | | | | |
| | 34 t | の 他 | | * L35 | | | | | |
| | | 36 | | 数 37 高 | H 1/3=5.8 m | 被 38 E | 件被39 | | |
| | 投 | 計算 | 料 | 周40 期 | 1 0 sec | 241 M A | β = 0° | | |
| | T.,_ | 13 | 提体(| 444 ~ , 9 | 4 副 数大 0.4 7 m | | | | |
| | 43 | 立 | 堤体 | 16 M M | 25' | | | | |
| /2 | 美 | 85 | 提件破 | なる状況 | ケーソン侗族 (港外) | 2函に巾1~3=程 | 度の象型 48 | | |
| | W | 23 | * * | 90 m a | 卷外, 延長95m 約30 | | | | |
| | 散 | ** | | 0 散乱 | ts L35 | | Maria Andrew | | |
| 爽 | | 石 - | 根間プ | 200数乱 | 延長30m約10個 | 53 | AND THE REST | | |
| | | | 務 被 | 子の散乱 | 延長30m約21個 | 55 | | | |
| | | 34 t | | fte | - | | | | |
| N | | | 被 | 37 * | H 1/3=4.76m | N 40 M | 9.0 sec | | |
| | 自然 | 96 自然条件 被 | | 57 向 | ENE | m 58 ta | | | |
| | | | | 57st 10 | 20h | E 60 % | | | |
| | | | | | そのままにして、亀製の | 入ったケーソンドつ | いて中誌。 養コンを | | |
| | 6/ | # | 数去じ | 補強コンクリ | ートを施工した。 62 | | | | |

- 1. Regional facility name
- 2. Kawaraki east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 6 July 1970
- 9. Typhoon No. 2
- 10. Damage status
- 11. 4 caissons shifted while upper concreting and part of dissipation works were being constructed; 2 of these developed 2-3 m/m wide cracks on the outer harbor sidewall; overlay and dissipation tetrapods being constructed in one part were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Sea sand. Unit volume weight 1.56 t/m3--in air.
- 21. Upper concreting in site
- 22. Unifinished
- 23. Riprap part
- 24. Foundation mound
- 25. Per price
- 26. Overlay
- 27. Riprap 1.0 t/piece inside and outside harbor
- 28. Consolidation blocks
- 29. Inside harbor
- 30. Precast concrete armor units
- 31. 12.5 t tetrapods (partly finished)
- 32. Wave dissipation riprap
- 33. 1.0 t/piece (partly finished)
- 34. Other
- 35. None
- 36. Design data
- 37. Wave height
- 38. Wave pressure
- 39. Breakers
- 40. Period
- 41. Angle of incidence
- 42. At time of damage
- 43. Amount of damage
- 44. Levee body slide

- 4 caissons, maximum 0.47 m
- 46. Levee body slope
- 47. Condition of levee body damage
- 48. Cracks 1-3 mm wide on 2 caisson sidewalls (outer harbor)
- 49. Dispersion of overlay
- Outside harbor, 95 m extension of about 300 m³; inside harbor 32 m extension of about 100 m³ (normal shoulder as well) Dispersion of foundation mound 50.
- 51.
- 52. Dispersion of consolidation blocks
- 53. About 10 extending 30 m
- 54. Dispersion of dissipation works
- 55. About 21 extending 30 m
- 56. Natural conditions
- 57. Wave direction
- 58. Tidal level
- 59. Duration
- 60. Wind velocity
- 61. Method of restoration
- 62. The shifted caissons were left as they were, fill and granular concrete removed from the cracked caissons and work was completed with reinforced concrete.





· 本一人) 跨海增售 延續 /

《海、水》智压凝磁镜

Key:

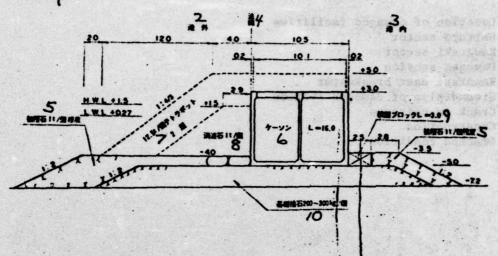
- Location of damaged facilities
- 2. Hattaro sector
- 3. Kawaraki sector
- 4. Damaged section
- 5. Kawaraki east breakwater
- 6. Ground plan of damaged section
 7. Crack in caissons

PAR-BROKE SE M. H.P.

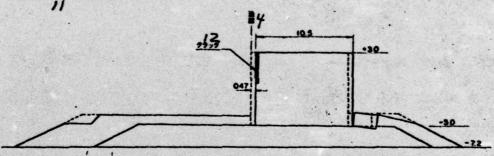
* 100 - 10 CO. St.

- 8. Construction
- 9. Cracked condition

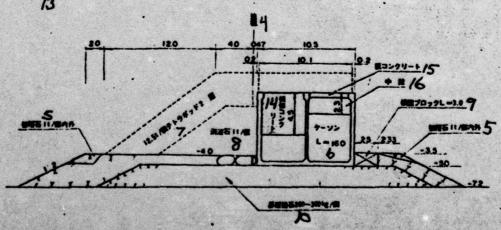
被災前断而悶(A-A)



後災時新面図(A-A)



復旧新面図(A-A) /3



| • | | | | . want | | | | |
|------------|--|--|--|--|---------------------|------|-------------------|--------------------|
| Cr | oss secti | on A-A pri | or to damage | | 9 9 9 | 36.3 | 450 | |
| Ou | ter harbo | r anamer | | INDEAS AND | | | | |
| In | ner harbo | r | | | | | | |
| No | rmal | | | | | | | |
| Ove | erlay | | | | | | | |
| Ca | isson | | | | | | | |
| Twe | layers | of 12.5 t | tetrapods | | | | 100 100 100 | |
| | wave-br | | AND AND ASSESSED. | | | | | |
| Co | nsolidati | on blocks | | | | | | |
| | undation | mound | 95 (4); Span 28 | · 建二氢化 克 | | | | |
| Cr | oss secti ack | on A-A at | time of damage | 1 1 1 4 | | | | |
| 03000 | Acres and control of the beautiful and the second | oss section | n A-A | | | | | |
| Re | inforced | concrete | | A regulate legace and | | | | |
| | ncrete | | V4. 18.0 m v | uly se-jos. | 10. 10 | | 100 A | |
| F1 | 11 | TOWN A R | HR W C. CREE | | | | | |
| | | | | | Aug Lange St. | | | |
| | | alls x a s | 0 152 | | 15. 32 | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | SA SE | 14 | | |
| | | | | | | 1.07 | | STREET, |
| | | | | | | | | |
| | 等先出 数. | T | and a wife of the | No. of the | | 5 | | |
| | to a | | | | | | 鑁 | September 1 |
| | | 自 推定人 | 1,441 | | | | | Sec. or |
| | | | 中國、競馬·拉克·拉克·斯尔 | 1 0 0 0 0 | A - 43 | | | in the second |
| | | The Control of the Co | | Charles and the Parkey | PERMIT | | 12.4 | |
| | | | 184 0 | W W W | | | | 22,000 |
| | | NA (6.8 t) | No and States | Strate of the | 1 15 28-7 | | | |
| e a plane | Alleria de la companya de la company | | er myt gallen i Sange galle sån se | professional rest in the | The same | | | |
| | | | 対策・対 | I B M W M | · 總 · 送 ·] | | | |
| | | | E J W | 1 数 数 在 特 | W 15 | - 韓 | | |
| 0.40 | Section and security of the section | yet anyther something | and the second second second | particular and a second second | | | | |
| | | | 本 共利 | [10 mm and 2000 | 冬风霜! | 1 | 1 | |
| | | | | | | | | |
| | and the second | The state of the state of the state of | and the state of t | g the state of the | | | | |
| | | | | 707 | | 12 | | |
| | 594 E D 2 | | CHAP TO SERVE STATE | | | | 1 | THE REAL PROPERTY. |
| to militar | THE RESERVE OF THE PERSON AS | 郑 蕊 既 | and the second second second second second | 74 | 1723 | | | 100 |
| | #1.5% | M AN W | N.E. | a cv | 5 100 | | 为由 | SALINA |
| eral mage | Maria de la Caración | Constitution of the state of | and the second s | process to top open | A service and the | | | Spinster, |
| | ye 10 9 4 1 | A 45 W | 2号 概定。 | 高。神 特 | 14 | | The same | Contract of the |
| 22 | 3. 图4一条电 | KN 3克斯多纳温 | there is a care | A decreased | 1.2. | | | |
| | | | ALL SEPERATE PARTY | | | | 22 | |
| | | | | The second secon | Sandy Transcription | | A 6 | |

| 建成 | 区施 | 股名 2 阿原木東防波堤 6施 I 中 | | | | | | | | |
|-----------|-----------|------------------------|------------|-----------------------|--|--------------------|-----------------|--|--|--|
| 被状 | 35 | 「一日 | | | | | | | | |
| | 13 | , 14, v | | す 15 # | 10.0 × 0.0 × 1.0.0 | 10.4 解驗 0.2 | 底数0.5 /6 | | | |
| | 立 | | | | 290-1 | | | | | |
| 12 | - | | | 中 19 路 | AND THE RESERVE THE SECOND SEC | | | | | |
| | | 上部 | 場所打き | ショリート | σ ₂₀ = 2 4 0 kg/cd | tei sarasas | A. 2007.03.606. | | | |
| | 22 | * 0 | 73 6 | 100~300 | kz/伽程度 24 | | Compress : | | | |
| 英 | * | * | I I | 卷外, 20.01 | ノ個被覆ブロック 26 港内 | 1. 1.0 1/ 個程 | 度. 拾石 | | | |
| | 石 | Baltin St | 37., | 海外 . 4.0×2 | H L 推列, B 2.5 | H L × 1.5 × 4,0 | | | | |
| | | 前後: | 前後光。1 なし31 | | | | | | | |
| 11) | M W % 5 | | | | | | | | | |
| | 33 t o M | | te U31 | | | | | | | |
| | | 34 | # | # 35 × | | 表 36 E | | | | |
| Jan Maria | - | 13 | i | m 38 期 センナベリ | | 139H A | B=0° | | | |
| | 41 | 立場は | | ザナベ り 7前, 最大0.186m 43 | | | | | | |
| 40 | " | 8 4 | # H | TO KR | | | | | | |
| k | * | 22 | * 0 | For a | n L 3/ | | | | | |
| | - | * | * 4 | Wo a a | t L31 | | ne Visit Berry | | | |
| 类 | | 25 | 数因プ | 49, 10 ma | n L31 | | | | | |
| | | | 前数 | Ton a | | | | | | |
| | | 33 | ŧ · | o 14 | | | | | | |
| 19 | 6 | 7 | 被 | 35 N | H 1/3=4.59 m (英國) | N 38 W | 1 0.5 sec | | | |
| | 自然 | 51 自然条件 被 | | 53 M | NE : | m 54 to | | | | |
| • | Ŀ | | | BESSE III | 4 BM 56 | ■ 57 × | | | | |
| 4 | S8 n # | | | | 継外領2マスを- 4.0 m 塩中 の各無量は防炎堤の機能上支 59 | | | | | |

- 1. Regional facility name
- 2. Kawaraki east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 13 Jan. 1972
- 9. Low pressure
- 10. Damage status
- 11. Hit by two low pressure systems on 13 and 16 Jan.; 7 caissons shifted a maximum of 0.186 m and cracks developed on the outer harbor sidewalls of 6 of these starting at the cusp.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Sand. Unit volume weight unknown.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. About 100-300 kg/piece
- 25. Overlay
- 26. Outside harbor, 20.0 t overlay blocks; inside harbor 1.0 t riprap
- 27. Consolidation blocks
- 28. Outside harbor
- ·29. Inside harbor
- 30. Precast concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. 7 caissons, maximum 0.186 m
- 44. Levee body slope
- 45. Condition of levee body damage

- 46. Cracks in sidewalls (outside harbor) of 6 caissons.
- 47. Dispersion of overlay
- 48. Dispersion of foundation mound
- 49. Dispersion of consolidation blocks
- 50. Dispersion of dissipation works
- 51. Natural conditions
- 52. Actual measurement
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. 4 h
- 57. Wind velocity

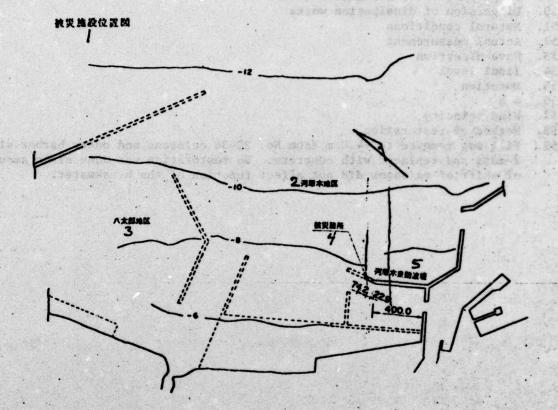
聚点 報

1.85

- 58. Method of restoration
- 59. Fill was removed to -4.0 m from No. 29-34 caissons and outer harbor side 2 mass and replaced with concrete. No restoration was done since amount of shift of caissons did not affect function of the breakwater.

被政治指統政治

Cristian in allegally



27 0.077 0.073 7-7588 74.2

6年三月 1日工品的公司

Key:

- 1. Location of damaged facilities
- 2. Kawaraki sector
- 3. Hattaro sector
- 4. Damaged section
- 5. Kawaraki breakwater
- 6. Ground plan of damaged section
 7. Cracks in caisson sidewalls
 8. Outer harbor

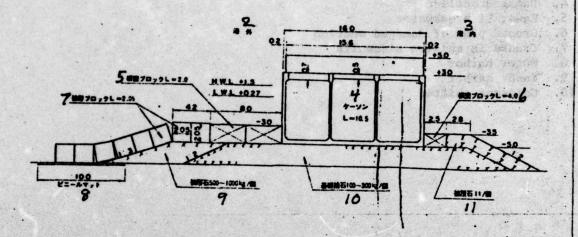
为自己的 900mm

- 9. Inner harbor
- 10. Caissons shifted

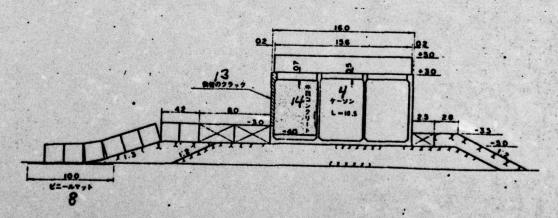
positions deposits to become

and has the chi.

被災的新面図(A—A)



復旧新函数(A-A) /2



Sales de la Militaria de la Arman

在医院的证据,还是由于可能的一种的成功的知识的是是

11. 11. 1 A VOL

Charles and a ment of

2000年,1900年

海黄树林或1亦作其为世

SEJ W TO XAR TO

Key:

- Cross section A-A prior to damage
- Outer harbor
- Inner harbor
- Caisson
- Consolidation blocks
- Consolidation blocks
- Overlay blocks
- 8. Vinyl mat
- Overlay stone 9.
- 10. Foundation mound
- 11. Overlay stone
- Restored section A-A 12.
- 13. Cracks in sidewalls

200 F I

数数 年 A 校 章

校 年 本 版 混 加

14. Concrete fill

-- R61 --

33 W.E.

2211

THE RESERVE TO SERVE A.

28 宮 古 港

.

| /地 [| X h | 段名 2出畸防被堤 | | | 現道様式 4ケーソン式混成幾 | | | | | |
|------|----------|--------------------------------------|--|-------------------------|-------------------------------|--------------|-------------|--|--|--|
| 完成年 | 月日 | る昭和 | 45年9 | A | 被炎年月日 2昭和 4 6年 | 1月16日 | 9(低気圧) | | | |
| 被状 | の表 | | | 3 画が最大 1.9 プロックが洗下し | 4 m 港内に移動し、とれに た。 // | the year non | ペットの間に勉製が | | | |
| | 13 | | | 1 15 th | B H I. 9.5×10.0×13.3 例 | 藍 0.4 隔壁 0.2 | 底盤 0.7 16 | | | |
| | | 14, | | א-דלעב | コンプート en=210kg/cml | | | | | |
| | 立 | 1 | | # 18 15 78.7kg/m² SD 30 | | | | | | |
| 12 | # | 中 19 は 上部場所打 ²³¹ ンクリート | | 中 19 18 | Mar. 20 | 单位体资重级 | 2.3 1/㎡ -水灯 | | | |
| | | | | トリクリート | e ₂₀ = 1 6 0 kg/añ | | | | | |
| | 22 | * 6 | 7 6 | 30~200kg | /位24 | | 70 B.19870 | | | |
| 炎 | 捨 | 被 | a I | 総外内とも 対 | 26 | | | | | |
| | 石 | 機關 | Harris Control | 28 B 2.0×1 | 28 B H L 2.0 × 1.0 × 2.5 | | | | | |
| | 都 | 荷被 | 妈,, | te 130 | | | | | | |
| 前 | | 前 设 ¹ 指 石 な し30 | | | | | | | | |
| | 32七 0 他 | | 在来地盤が軟弱なため古レールを円形すべり防止用に使用33 | | | | | | | |
| | _ | 34 数 数 数 | | 被 35 高 | H 1/3 = 4.0 m | ₩ 36 E | 部分种故 37 | | | |
| | | | | m 38 m | 1 1.0 sec | 入39射 为 | β=0° | | | |
| | ,,, | 13 | 提件 | 62+ ~ · 9 | 3弱,7最大 1.9 4 m | •• | | | | |
| | # | l | | 46 M M | * L30 | | | | | |
| 40 | 炎 | 部 | | 教育の状況 | t 130 | | | | | |
| | | 22 | 被极 | FOR A | ts L 30 | | | | | |
| | 数 | 石 | 选择的通知 | 古白数乱 | # L30 | | | | | |
| 爽 | 2 | 部 | | 4800敗乱 | 不明49 | | de services | | | |
| | | | all and the second second | 200 数 乱 | | | | | | |
| | | 32 | * | o 18 | te 130 | , , , | | | | |
| 時 | 5 | 51 1 | | 35 A | H 1/3=4.6m (推定) | 周 38 期 | | | | |
| | 自然条件 被 | | 53 m | β = 0° | M 54 tt | | | | | |
| • | | | | \$155 st 100 | 10h | ₩ 56 差 | 1 | | | |
| 復(| 57 旧方 | 佐 | State of the state | 式により、彼田も 体は原形に復旧っ | と再計算し数圧燃ご耐え得る。 する。 58 | ように港内側に捨る | 日を補強し、移動し | | | |

28. Miyako Harbor

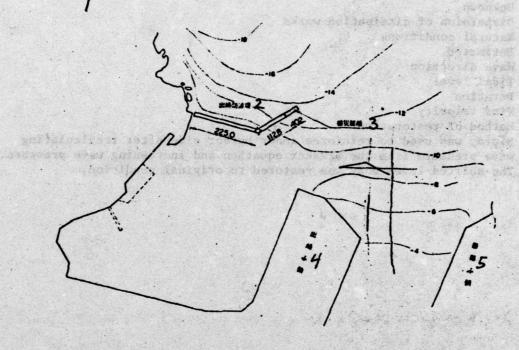
- 1. Regional facility name
- 2. Idesaki breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Sept. 1970
- 7. Date damaged
- 8. 16 Jan. 1971
- 9. Low pressure
- 10. Damage status
- 11. Three caissons newly placed on the top part shifted a maximum of 1.94 m toward inside harbor and because of this cracks developed between super-structure and parapet with the consolidation blocks settling.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.7
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Slag. Unit volume weight 2.3t/m3--fulling.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. 500 kg-1.0 t riprap inside and outside harbor
- 27. Consolidation blocks
- 28. Outside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Because of weakening of present basin, old rails used to prevent round slide
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Partial breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. 3 caissons, maximum 1.94 m

- 44. Levee body slope
- 45. Condition of levee body damage
- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. Unknown
- 50. Dispersion of dissipation works
- 51. Natural conditions
- 52. Estimated
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. Wind velocity
- 57. Method of restoration
- 58. Riprap was used to reinforce inner harbor side after recalculating wave pressure from the breaker equation and increasing wave pressure. The shifted levee body was restored to original condition.

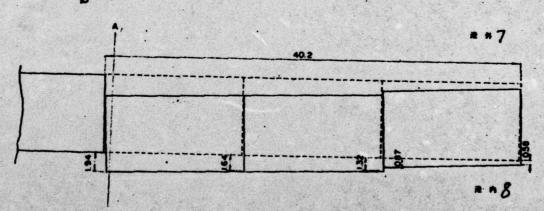
经历史多数文本

200

被災施設位置因



被災臨病平面的



28. Miyako Harbor

出てA - A : 特別整節が進

(五一人)以施數銀四份。

主奉标本的现代的政策

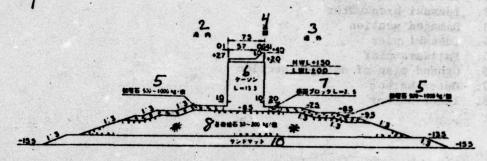
Key:

- 1. Location of damaged facilities
- 2. Idesaki breakwater
- 3. Damaged section

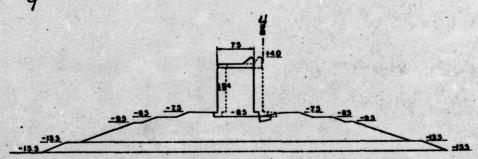
- 4. Idesaki pier
 5. Fujiwara pier
 6. Ground plan of damaged section
- 7. Outer harbor
- 8. Inner harbor

and the last

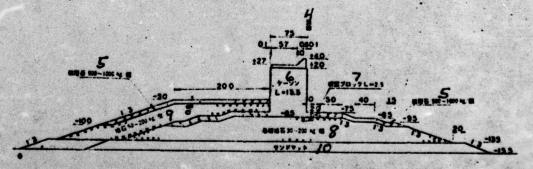
被災的断頭悶(A-A)



後災時折面図(A-A)



後旧新前間(A-A) /Oモ



28. Miyako Harbor

TENNO PRINCIPLE DESCRIPTION

本名 、 联系 1 、 经第

(特別) #13 四年2月1

THE COMPANY OF THE STATE OF THE PROPERTY OF TH

AR I B B W B W B B B B B

新州的支持⁴4大 印度

the self-to-the

P2 --

(所) 推進 森斯 本 图 表 图 新日

Lating on a party

Key: a grant of the rest of the control of the control

- 1. Cross section A-A prior to damage
- 2. Inner harbor
- 3. Outer harbor
- 4. Normal
- 5. Overlay
- 6. Caisson
- 7. Consolidation blocks
- 8. Foundation mound
- 9. Cross section A-A at time of damage

where where was before the man was

CP R T M PE W

- 10. Sand mat
- 10a. Restored cross section A-A

| 龙 | 区施 | 段名 2防 | 故楼(神) | | 株式 4ケーソン | | | |
|-----|-------------|--|----------------------|--|------------------------|------------------------|--|--|
| 完成年 | 年月日 | 6昭和46年 | 3月25日 | 被炎年月日 多3和 4 6年 | 9月11~13日 | 9(台版 26号) | | |
| 被状 | の表 | Lto th | ケーソン2首が移 | よび基礎核石、港内側、被引動したが先端の1級は残疾 0.3m港内側へ移動した。 | こよる基礎捨石洗 | | | |
| | 13 | | 寸 15 佳 | 10000000 | 20.4 隔载0.2 | 建設 0.5 /6 | | |
| | ¥ | 1-14 | 3299-h | em = 2 1 0 kg/cd | | | | |
| 12 | * | | | | | | | |
| 被 | # | | ф 19 ts | | | | | |
| | | | 台シクリート | 使用セメント量 2 6 0kg/ | 22 | | | |
| | 23 | E 16 7 | 5 800kg/個P | 49425 - | | | | |
| 英 | * | | | | 拾石1.0 t/個 | 27 | | |
| | 6 | 根因プ ⁸ - ク 格介 ⁴ 3.0×1.5×3.0 格内 3.0×1.5×2.0 前数プ ⁴ - ク な し 32 | | | | | | |
| | | | | | | | | |
| H | | 相思社 | 5 t L 32 | 2 | | | | |
| | 34 t | 0 他 | t L 32 | | | | | |
| | | 35 | # 36 m | H 1/3=6.0m | ₩ 37 E | 种 数 39 | | |
| | | 計資料 | m 39 m | 不明40 | 入州射 为 | P=15° | | |
| | | 福 提供 | 334 ~ 1 | 2面, 数大0.3m 44 | | | | |
| | 42 | 立模 | # 15 M M | 2° 53' | | | | |
| #/ | 爽 | 都提体 | 电影 0 状况 | te L 32 | | | | |
| | ^ | 23 被 6 | 1 16 W M | 卷外,延長不明 55個 | 48 港内. 延長 | 不明 100㎡ | | |
| | 数 | * = = = | # 648 W B | 着外,延長不明 220m | 150 mm. 3~ | 5 m 180m' | | |
| 类 | | 石板間 | 705/10BE | 卷外. 10個 52. 卷内. 11個 | | | | |
| | | | 1 1 de a | | 5257 W | | | |
| | | 34 t | 0 16 | | | | | |
| 14 | | | 36 × | H1/3=4.4m(日前) | m 39 m | 不明40 | | |
| | 自然 | 条件 技 | 56 m | ESE | m 57 tt | +1.76m | | |
| | | | 85% NO | 4 | ■ 59 × | Pt ESE 7.2m/sec | | |
| | 61 B # | . 9 | 災した種外側基礎 には最流による基 | 石と総内側共義石、被仮石、 養石の飲乱を防止するために とケーソンは防災機の機能上即 62 | 提問プロックは! 0.0 t/数テト: | 京形に復旧し、総外 ラポッドで荷放工を | | |

29. Ena Harbor

- 1. Regional facility name
- 2. Breakwater (offshore)
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 25 Mar. 1971
- 7. Date damaged
- 8. 11-13 Sept. 1971
- 9. Typhoon No. 26
- 10. Damage status
- 11. Dispersion of overlay tetrapods and foundation mound on outer harbor side and of overlay rock, foundation mound, and consolidation blocks on inner harbor side. Two caissons shifted, 1 cusp caisson shifted toward outer harbor side 0.2 m because of scouring of foundation mound by eddies and one other shifted 0.3 m toward inner harbor.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Concrete. Unit volume weight 2.3 t/m3
- 21. Upper concreting in site
- 22. Cement used 260 kg/m3
- 23. Riprap part
- 24. Foundation mound
- 25. 800 kg/piece inside and outside harbor
- 26. Overlay
- 27. 12.5 t tetrapods outside harbor; 1.0 t riprap inside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Inside harbor
- 31. Precast concrete armor units
- 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide

- 44. 2 caissons, maximum 0.3 m
- 45. Levee body slope
- 46. Condition of levee body damage
- 47. Dispersion of overlay
- 48. Extension unknown outside harbor, 55 pieces; inside harbor unknown, 1003
- 49. Dispersion of foundation mound
- 50. Extension enknown outside harbor, 220 m; inside harbor 3-5 m, 180 m
- 51. Dispersion of consolidation blocks
- 52. 10 blocks outside harbor, 11 blocks inside harbor
- 53. Dispersion of dissipation works
- 54. Natural conditions
- 55. Visual measurement
- 56. Wave direction
- 57. Tidal level
- 58. Duration
- 59. Wind velocity
- 60. Average ESE 7.2 m/sec; peak N 10.7 m/sec
- 61. Method of restoration

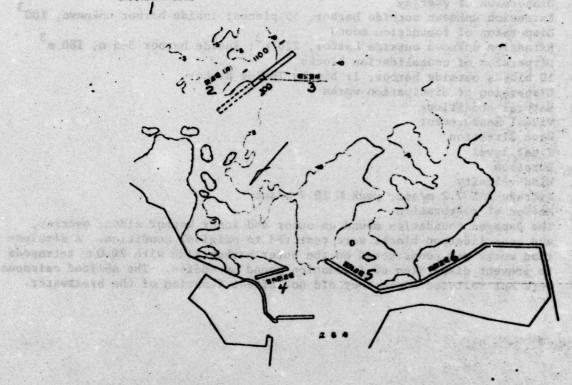
整牌 縣

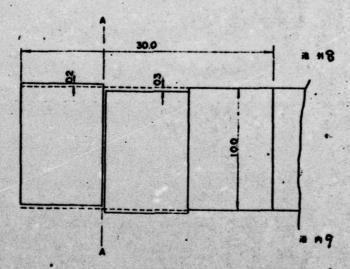
62. The damaged foundation mound on outer and inner harbor sides, overlay, and consolidation blocks were restored to original condition. A dissipation works was constructed on the outer harbor side with 20.0 t tetrapods to prevent dispersion of foundation mound by eddies. The shifted caissons were not restored since they did not affect function of the breakwater.

perty domination rest is not to more hear.

and the party of the makes a country

被災施設位置図





FEE

29. Ena Harbor

一人 光一元 为即是 连接的

(8 - 8) (图 图 图 2 分

(表示第三 跨速 出规数

Key:

- 1. Location of damaged facilities
- 2. Breakwater (offshore)
- 3. Damaged section
- 4. East outer breakwater
- 5. West breakwater
- 6. South breakwater
- 7. Ground plan of damaged section

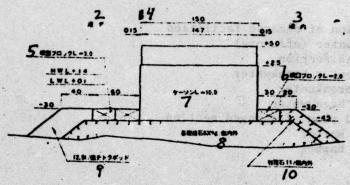
01

- 8. Outer harbor
- 9. Inner harbor

STAND SCHOOL

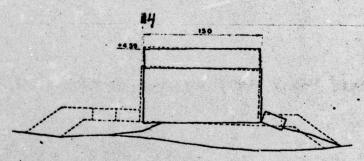
H

被災前前面間(A—A)

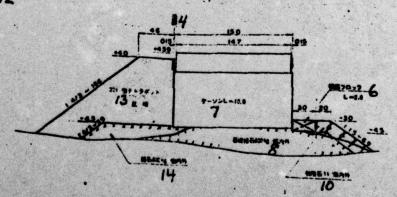


118

後災時新面間(A-A) //



復旧新資間(A-A)



人工上海 英 赞见 "京"看 动"云

Key: Has At the set of the sandard the sandard to the sandard to the sandard t

- Cross section A-A prior to damage
 Outer harbor
- Inner harbor
- Normal
- Consolidation blocks
- Consolidation blocks
- 7. Caisson
- 8. Foundation mound about 800 kg/piece
- 9. 12.5 t tetrapods
- 10.
- Overlay about 1 t/piece
 Cross section 1 Cross section A-A at time of damage 11.
- 12.
- Restored cross section A-A

 20 t tetrapod random rubble
 Riprap about 800 kg/piece 13.

TEM A LA SA D

14.

THE PARTY SAME AS A SECRETARY OF THE SAME ASSESSMENT

各国市市大小司公司宣史中主席 為 法

BRUNE VENE

WIR PROD

③ 中の作港

| /地 | 区施 | 段名 | 2防 数 | (堤(E) | | 株式 4ケーソン | | | |
|-------------|------------|----------------|------------------|------------------|---|-------------|-----------------|--|--|
| 5完成年月日 6昭和4 | | 4 2年3 | 月25日 | 7数炎年月日 8昭和 4 6年 | 9月11~13日 | 9(台版26号) | | | |
| 被状 | 10 克 | 9 1 1 7 TOOL I | | | クが散乱した。また同時化、 三角プロックおよび 5.0 t/ 【】 | | | | |
| | 교 | nı | | す 15 生 | B H L 10.0×5.5×12.5 例如 0.0×5.5×12.5 例如 | 第0.4 陽繁 0.2 | 底盤 0.5/6 | | |
| | 立 | 7- | 77 | # 18 B | 97.2kg/m² SD : | 30 | erges of 111 | | |
| 12、被 | 都 | | | 中 19 路 | 中 19 站 コンクリート 20 単位体積重量 2.3 七/㎡ | | | | |
| | | 上部 | 级所打 ² | シクリート | セメント使用量 270kg/ | m² 22 | te minaroda ak | | |
| | 23 | | 24 石 | 300~700 |)kg/@25 | | | | |
| 英 | 78 | | 26 I | | 自石500~700kg/個 27 | | | | |
| | 石 | - | B H L | | | | | | |
| | 都 | | | | 空三角プロック乱積 32 | | | | |
| 的 | | 前被猪石 | | | | | | | |
| | 354 | 0 1 | <u>r</u> | tz 134 | | | | | |
| | 12 | 36 H A | #4 | 故 37 高 | H 1/3 = 5.3 m | 被 38 旺 | 种被39 | | |
| | 1/21 | | | 男 40 期 | 不明4/ | 入42射 为 | β = 0° | | |
| | 44 | 4 4 | | -11/ | ts 1.34 | | | | |
| 43 | • | 部 | 提供 | 78 福 科 教 初 の 状 況 | な し34 な し34 | | | | |
| 被 | 类 | 23 | 被操 | 180 h a | ts L 34 | | | | |
| | 散 | * | | 古 版 乱 | te L34 | | | | |
| | | 7 | | 50,0 m t 1.34 | | | | | |
| 7 | Ī | - | | 50 m a | 中空三角プロック80個 | 52. | | | |
| | | 35 | ŧ | 他 | - | | | | |
| | _ | 2 | 被 | 37 🛎 | H max = 7.0 m (日初) | N 40 M | 本明4 / | | |
| | CONTRACTOR | 53 日然条件 枚 粒 | | 55 向 | ESE | 期 56 位 | +1.76m | | |
| | | | | 925 765 NO | 46 | M 58 M | FE ESE 7.2m/sec | | |
| a | 60 B # | # | 本体 | の補強も兼ね。 | 天端を+5.0mまで応くして 61 | 後旧した。 | | | |

30. Nakanosaku Harbor

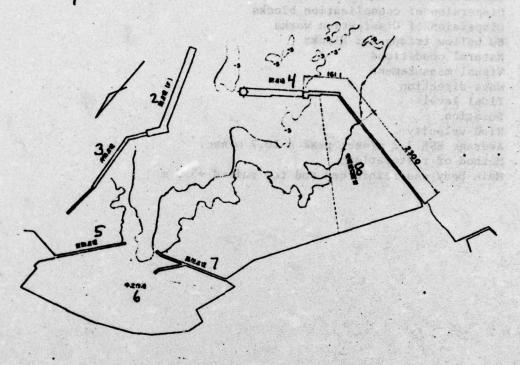
- 1. Regional facility name
- 2. Breakwater (E)
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 25 Mar. 1967
- 7. Date damaged
- 8. 11-13 Sept. 1971 ;
- 9. Typhoon No. 26
- 10. Damage status
- 11. 12.0 t triangular blocks were scattered. At the same time 6 t hollow triangular blocks and 5.0 t concrete blocks of the adjoining protecting shore (levee D and levee C) were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Concrete. Unit volume weight 2.3 t/m3
- 21. Upper concreting in site
- 22. Cement used 270 kg/m³
- 23. Riprap section
- 24. Foundation mound
- 25. Per piece
- 26. Overlay
- 27. 500-700 kg riprap inside and outside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Inside harbor
- 31. Precast concrete armor units
- 32. 12.0 t hollow triangular block random rubble
- 33. Wave dissipation riprap
- 34. None
- 35. Other
- 36. Design data
- 37. Wave height
- 38. Wave pressure
- 39. Breakers
- 40. Period
- 41. Unknown
- 42. Angle of incidence
- 43. At time of damage
- 44. Amount of damage
- 45. Levee body slide

- 46. Levee body slope
- 47. Condition of levee body damage
- 48. Dispersion of overlay
- 49. Dispersion of foundation mound
- 50. Dispersion of consolidation blocks
- 51. Dispersion of dissipation works
- 52. 80 hollow triangular blocks
- 53. Natural conditions
- 54. Visual measurement
- 55. Wave direction
- 56. Tidal level
- 57. Duration
- 58. Wind velocity
- 59. Average ESE 7.2 m/sec; peak N 10.7 m/sec.
- 60. Method of restoration
- 61. Main body was reinforced and top raised +5.0 m

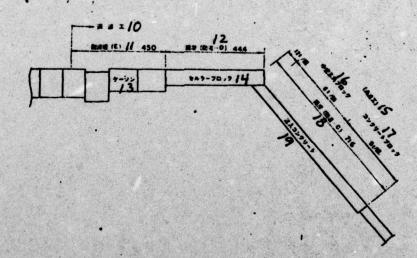
toved holf slags condition of leven budg damage

Entrano to moiss well

被災施設位置閃



被災售所早面因



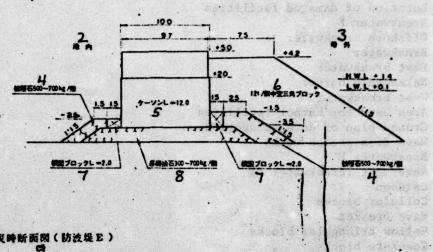
30. Nakanosaku Harbor

では製造けりいる物質的

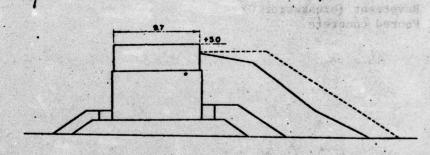
- 1. Location of damaged facilities
- 2. Breakwater F
- 3. Offshore breakwater
- 4. Breakwater
- 5. East breakwater
- 6. Nakanosaku harbor
- 7. West breakwater
- 8. Area used for harbor facilities
- 9. Ground plan of damaged section
- 10. Wave dissipation works
- 11. Breakwater E
- 12. Revetment (breakwater D)
- 13. Caisson
- 14. Cellular blocks
- 15. Wave-breaker
- 16. Hollow triangular blocks
- 17. Concrete blocks
- 18. Revetment (breakwater C)
- 19. Poured concrete

30 中之作港

後災前断血烈(防波堤E)

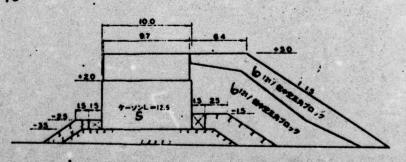


被災時断而関(防波堤E)



161

復旧断函数(防波堤E) 10



30. Nakanosaku Harbor

部 許 宏 中 原

《母子原群设施》 经累额担当

(2-) 特殊的) 多形式原则

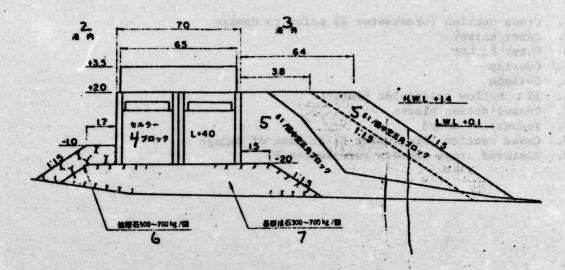
Key:

- 1. Cross section (breakwater E) prior to damage
- 2. Inner harbor
- 3. Outer harbor
- 4. Overlay
- 5. Caisson
- 6. 12 t hollow triangular blocks
- 7. Consolidation blocks
- 8. Foundation mound
- 9. Cross section (breakwater E) at time of damage
- 10. Restored cross section (breakwater E)

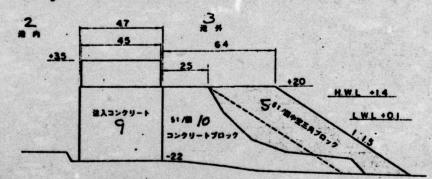
(A) (A) (A) (A) (A) (A)

me [4] mi

被旧断面図(総岸防波-D)



後旧新面間(後半防波-C)



30. Nakanosaku Harbor

SL- # 16 37 8

黄星

c there is no an a consideration of the state of the stat Key:

- 1. Restored cross section (revetment breakwater D)
- 2. Inner harbor
- Outer harbor
- Cellular blocks
- 6 t hollow triangular blocks
- Overlay
- Foundation mound
- Restored cross section (revetment breakwater C)

to a tell as a land of the angle and

TP / BOX - MO - A TOWNST A SACT TO A TO BE OF BUILDING

principle said a sight is not

TO SHE WIND AND THE ME AND THE ME

of what area the two senders acon, are the property There are the me have a more of the angle of the man ABRIOTA CONTRACTOR ACCOUNT NOON AND LEGISLAND TO LEGISLAND AND ACCOUNT.

122 Fig TE WI TRAINS

Ta the start of the start

as inchica a fermulation was an expension and accompany Approximate of the contraction o

- Poured concrete
- 5 t concrete blocks

-311-

43 127 15843

| /地区旅设名 241 1 | | | | 西防放災 B構造様式 4ケーソン式混成堤 | | | | | | | |
|-----------------|------------------|---|------------------|--|------------|--|----------------------|---------------------------|--|--|--|
| 完成年月日 【昭和43年3月2 | | | | 月25日 | | 7被炎年月日 8昭和 4 6年 | 4月29~30日 | 9(低氢旺) | | | |
| 校伙 | の教 | 超特 一十 | により巻 | 外侧はC | 区被侵 | 区、D区、E区の3つのター 801/65トラボッドおよび被よび基準括。 港内側は校覧 ケーソンには移動およびケー | 複中空三角プロッ 変石および役割プ | ク. D区被覆コンクリ ロックが全性長に亘り | | | |
| | 13 亩 | | | | 5 # 7 . | E型 13.0×9.5×10. | 0 例壁 0.4 開墾 | 10.2 底盤 0.5 16 | | | |
| 12. | | 4-14× | | コンプリート ega = 2 1 0kg/cdl 数 18 数 9 7.6kg/cdl | | | | | | | |
| | #5 | | | ф J | | 訪 飼さい 20 単位体積重量 2.2 i/d | | | | | |
| • | | 上部 | 临所打3 | | - | セメント使用量230kg/ | | | | | |
| | 23 | | 基 题 括 石 50kg/翻25 | | | | | | | | |
| 爽 | 檢 | 被 | 16 I | 难外. | 拾石5 |) Okg/例~1.0 t/但 義 | 内, 格石 2 0 0kg | V假 27 | | | |
| | 5 | 极图 20 , 9 港外 2.5 × 1.0 × 2.5 港内 2.0 × 1.0 × 2.0 | | | | | | | | | |
| | 都 | 務故: | 前後子1.7 なし32 | | | | | | | | |
| M | | 捐献 | 7 E | t L32 | | | | | | | |
| | 342 | 342 0 他 なし32 35 故 36 高 数 計 数 科 | | | 32 | | | | | | |
| | 10 | | | | | H 1/3=6.2 m | 被 38 H | 幹 故 39 | | | |
| | | | | 月 3 | | 1 4 sec | 入40射 为 | β = 20° | | | |
| | ¥2 数 灾 | 量 提 体 | | #3 ₇ ~ り 11亩, 数大0.9 6m 44 | | | | | | | |
| 41 | | 立即 | | 716 | | | | | | | |
| 41 | | 23 | | 度 編 の 状 紀 ケーソン1 2 頭にひび割れ、かん改、欠があく 47 480 敷 乱 魅外、延長1,200m 33,100㎡ 港内、延長447m 3,300㎡ 4 | | | | | | | |
| | 數 | 23 | | (上 0 版 乱 港外, 延長1,200m 7,700m 港内, 延長447m 2.500m | | | | | | | |
| | | 15 | | 52,0 散乱 港外, 延長 1,200m 1,000儲 港内, 延長 447m 440個 | | | | | | | |
| 製 | | - | | 540 M 81 - | | | | | | | |
| | | 34 | | | 他 | - | | | | | |
| M | NAMES OF TAXABLE | | 被 | 36 | × | Hmax = 8.7 m (14.4) | 用 37 期 | 不明57 | | | |
| | | | 58 | 向 | SE | # 59 to | 本 957 | | | | |
| | | | 8260 sty | MO | 不明57 | 服 61 差 | 平均 9.8m/m 62 | | | | |
| a (| 63, | ŧ. | 移動 | ケーソン | は、快 | より所要プロック重量で根 能上支障がないので復旧した 打殺して使旧した。なお。! 64 | ないとととし、 敬 | 損したケーソンは中 | | | |

- Regional facility name
- 2. West breakwater no. 1
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 25 Mar. 1968 6.
- Date damaged
- 8. 29-30 Mar. 1971
- Low pressure
- 10. Damage status
- 11. Places damaged at this time extended far; divided into 3 types, C. D. and E sections; on outer harbor side where front normal basin scouring occurred, 8.0 t C-section overlay tetrapods and overlay hollow triangular blocks were overreached on their whole extension and dispersed. The same happened with D-section overlay concrete blocks, E-section overlay stone and foundation mound as well as overlay and consolidation blocks on inner harbor side. E-section caissons shifted and were damaged by waves.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. E-type. Sidewall 0.4, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- Slag. Unit volume weight 2.2 t/m3. 20.
- 21. Upper concreting in site
- 22. Cement used 230 kg/m3
- 23. Riprap part
- 24. Foundation mound
- 25. 50 kg/piece
- 26. Overlay
- 27. 500 kg-1.0 t riprap outside harbor; 200 kg riprap inside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Inside harbor
- 31. Precast concrete armor units
- 32.
- 33. Wave dissipation riprap
- 34. Other
- Design data 35.
- 36. Wave height
- 37. Period
- 38. Wave pressure
- 39. Breakers
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage

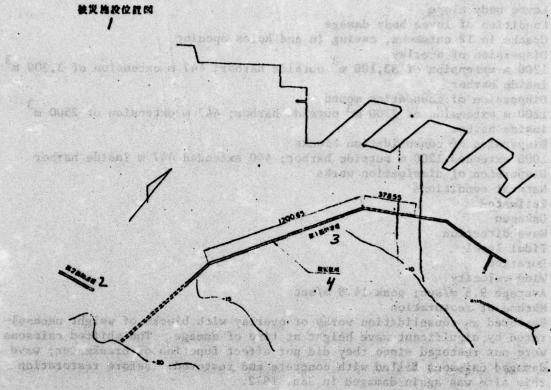
- 43. Levee body slide
- 44. 11 caissons, maximum 0.96 m
- 45. Levee body slope
- 46. Condition of levee body damage
- 47. Cracks in 12 caissons, caving in and holes opening
- 48. Dispersion of overlay
- 49. 1200 m extension of 33,100 m outside harbor; 447 m extension of 3,300 m inside harbor
- 50. Dispersion of foundation mound
- 51. 1200 m extension of 7700 m³ outside harbor; 447 m extension of 2500 m³ inside harbor
- 52. Dispersion of consolidation blocks
- 53. 1000 extended 1200 m outside harbor; 440 extended 447 m inside harbor
- 54. Dispersion of dissipation works
- 55. Natural conditions
- 56. Estimated
- 57. Unknown
- 58. Wave direction
- 59. Tidal level
- 60. Duration
- 61. Wind velocity
- 62. Average 9.8 m/sec; peak 14.8 m/sec
- 63. Method of restoration
- 64. Restored as consolidation works or overlay with blocks of weight necessitated by significant wave height at time of damage. The shifted caissons were not restored since they did not affect function of breakwater; wave damaged caissons filled with concrete and restored. Before restoration this site was again damaged in Jan. 1972.

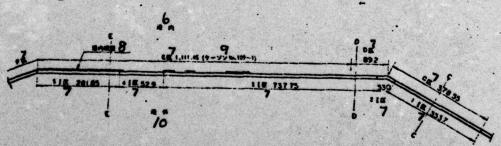
安部推行飞速沫

器基本 ****

m de d maisme att mates 11







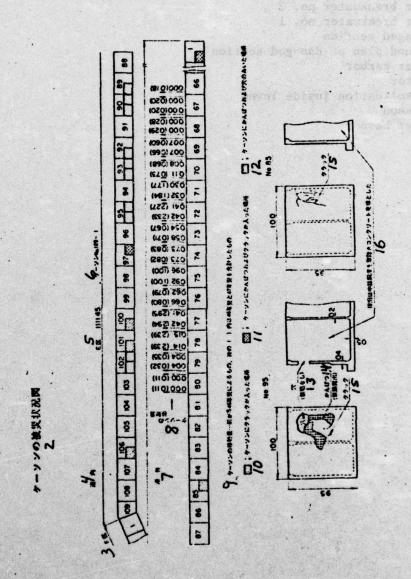
San Stage

Key:

- 1. Location of damaged facilities
- 2. West breakwater no. 2
- 3. West breakwater no. 1
- 4. Damaged section
- 5. Ground plan of damaged section
- 6. Inner harbor
- 7. Sector
- 8. Consolidation inside levee
- 9. Caisson
- 10. Outer harbor

③ 小 名 浜 港

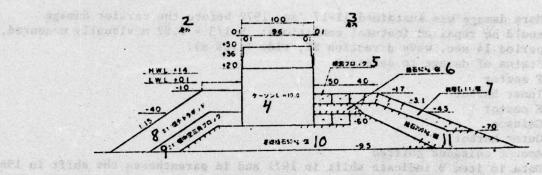
当災害の復旧を行なわないうちに 4 7年1月11~17日に関示の通り再び被災し地級した。(自然条件: H. 5/2 - 6.82m……実際、周期 1 4see, 波高SE, 悪位十1.38 m)



- More damage was sustained 11-17 Jan. 1972 before the earlier damage could be repaired (natural conditions: H 1/3 = 6.82 m visually measured, period 14 sec, wave direction SE, tide +1.38 m).
- 2. Status of damage to caissons
- 3. F sector
- 4. Inner harbor
- 5. E sector
- 6. Caisson
- 7. Outer harbor
- 8. Amount caissons shifted
- 9. Data in item 8 indicate shift in 1971 and in parentheses the shift in 1962.
- 10. Places where cracks appeared in caissons
- 11. Places where caissons cracked and caved in
- 12. Places where caissons cracked and holes developed
- 13. Holes. No reinforcing steel.
- 14. Caved in. Reinforcing steel exposed.
- 15. Crack
- 16. In restoration fill steel removed and concrete poured in.

③ 小名浜港

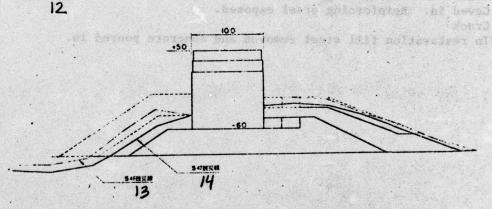
被災前断而図(C-C)



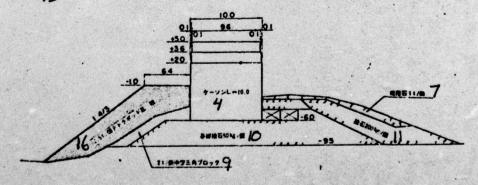
Places Perce Carolis Appeared to culsions Places There Calosows Circles and crywella. Places there carespes practice and holes lev

. 1959a. garanolqica di tweich

被災時断面図(C-C) 12、



復旧斯面図(C-C)
· 15



1.40-0.3 医硫酸酸医类

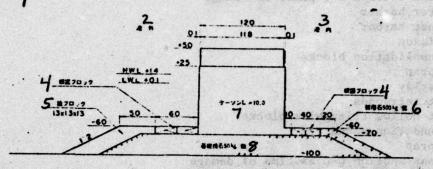
人的一切 医髓管 的现在

- Cross section C-C prior to damage
- 2. Outer harbor
- 3. Inner harbor
- Caisson
- Consolidation blocks
- 6. Riprap
- 7. Overlay
- 8. 8 t tetrapods
- 9. 2 t hollow triangular blocks 10. Foundation mound

- 12. Cross section C-C at time of damage
- 13. Damage from 1971 14. Damage from 1972
- 15. Restored cross section C-C
- 16. 12.5 t tetrapod random rubble

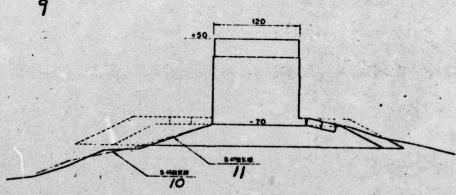
③ 小名英港

被災前断面図(D-D)

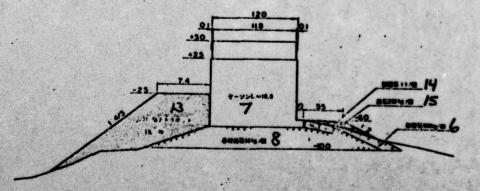


Andread ... super section that a billion of the company of the com

被災時新面別(D-D)



復旧新属図(D-D) /2



(建分)建工 (超级)建设 提供

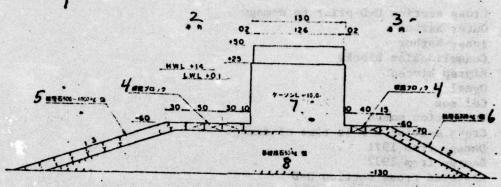
2. (《黄产星》新星年4. 2章 /

Key:

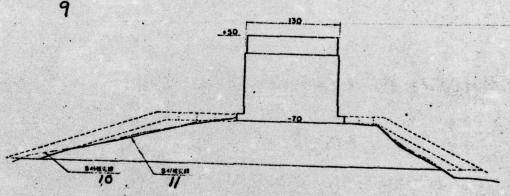
- Cross section D-D prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Consolidation blocks
- 5. Riprap blocks
- 6. Overlay
- 7. Caisson
- 8. Foundation mound
- 9. Cross section D-D at time of damage
- 10. Damage from 1971
- 11. Damage from 1972
- 12. Restored cross section D-D
- 13. 20 t tetrapod random rubble
- 14. Overlay 15. Riprap

102

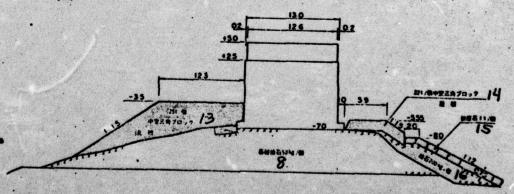
被災前断配図(E-E)



被災時断面図(E-E) 9



復旧断函図(E-E) /2



至大河南北海南 古 在 在 西 四 5

151 1

Key:

- 1. Cross section E-E prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Consolidation blocks
- 5. Overlay
- 6. Overlay
- 7. Caisson
- 8. Foundation mound
- 9. Cross section E-E at time of damage
- 10. Damage from 1971
- 11. Damage from 1972

7 ST 4 ST 10 ST 10

- 12. Restored cross section E-E
- 13. 25 t hollow triangular block random rubble
- 14. 22 t hollow triangular blocks
- 15. Overlay
- 16. Riprap

4-851 ---

TPATE WALLEY

AND THE RESERVE

WAS THE A RESIDENCE OF THE PARTY OF THE PART

100 mg

| /地区施设名 2.新 | | | 2.8 2 | 西防被处 | Beat | B線遊様式 4ケーソン式配成堤 | | | | | |
|--------------|--|--------------|------------------------|--|--|-----------------|------------------|--|--|--|--|
| 完成年月日 | | (格 I 中 | | | 7 被災年月日 3 日和 4 5 年 1 | A318 | 9(低级压) | | | | |
| 被状 | 0 规 | LT | . 4 開室 | の蓋コンクリー | し、据え付け表コンクリート トが跳波により破場、または 号両は確塞に亀裂が生じた | | | | | | |
| | 13 | , 14, x | | 寸 /5 法 150×11.0×10.0 何歌 0.4 院塾 0.2 底鉄 0.6 /6 | | | | | | | |
| /公数 | 立 | | | | 100 | | | | | | |
| | 都 | | | # 19 th | | | | | | | |
| | | 上部 | 場所打二 | 299-1 | 未施工(セメント使用量2 | 2 0kg/m²) 27 | | | | | |
| | 23 | # 6 | | 5 0kg/假以 | 25 | ingostu. | wallen a ca | | | | |
| 災 | 拾 | 被 | | | 石 1.0 t/领以上 27 | | - 1 1 MAIG NOT | | | | |
| | 6 | | A.,, | 2.5 × 1.0 × 2.5 | | | | | | | |
| | 部 | 前改プロック な し32 | | | | | | | | | |
| 的 | | 商品 | 海 石 | t 132 | | | | | | | |
| | 34+ | 344 0 他 な | | | t 132 | | | | | | |
| | je. | 设计资料 | | | H 1/3=6.1 m | 枚 37 日 | # # 38 | | | | |
| | | | | 的 39 期 | 1 4.0 sec | 入40时 角 | β=0°. | | | | |
| | 投 | 日 | 提体 | ¥3+ ~ り 11高. 股大2.6m 44 | | | | | | | |
| | | 立郎 | | 45 44 84 | tr 132 | | | | | | |
| * | | 23 | HEADERS AND THE | 180 数 乱 | 解聚化电裂、1億47 | | | | | | |
| 爽 | | | | FOR B | 不明49 | | | | | | |
| | | 石 | | 5! , o 散乱 | 不明49 | | | | | | |
| | | # | | TO H EL | | | | | | | |
| | | 34 | | 0 他 | | | | | | | |
| • | 100 | | | 36 K | 升1/3=4.97m(美國) | m 39 m | 8.1 sec | | | | |
| | 自然条件 校 | | 55 向 | 不明49 | m 56 6 | + 1.8 m | | | | | |
| | R | | | 版5万h 阳 | 7 h | M 58 2 | 8 4th 9.9 m/sc 5 | | | | |
| ä | 60 用方 | 扶 | | ままで、中語流 | よび税因プロックは補充。経 出影所は特充し陥寂に亀製の 61 | | 移動したケーソンは | | | | |

- 1. Regional facility name
- 2. West breakwater no. 2
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 31 Jan. 1970
- 9. Low pressure
- 10. Damage status
- 11. Overlay and foundation mound dispersed, and caissons completed to point of replacement and concreting shifted in a jagged fashion; concrete of 4 compartment walls destroyed by spray and 27 walls sunk down with loss of fill; 12 caissons developed cracks in the compartment walls
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.6
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Slag. Unit volume weight 2.2 t/m³.
- 21. Upper concreting in site
- 22. Unfinished (cement used 220 kg/m³)
- 23. Riprap part
- 24. Foundation mound
- 25. More than 50 kg/piece
- 26. Overlay
- 27. More than 1.0 t riprap outside and inside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Inside harbor
- 31. Precast concrete armor units
- 32. None
- 33. Wave dissipation riprap
- 34. Other
- 35. Design data
- 36. Wave height
- 37. Wave pressure
- 38. Breakers
- 39. Period
- 40. Angle of incidence
- 41. At time of damage
- 42. Amount of damage
- 43. Levee body slide

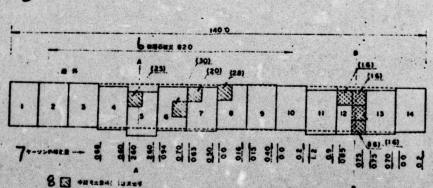
- 44. 11 caissons, maximum 2.6 m
- 45. Levee body slope
- 46. Condition of levee body damage
- 47. Cracks in compartment wall in one caisson
- 48. Dispersion of overlay
- 49. Unknown
- 50. Dispersion of foundation mound
- 51. Dispersion of consolidation blocks
- 52. Dispersion of dissipation works
- 53. Natural conditions
- 54. Actual measurement
- 55. Wave direction
- 56. Tidal level
- 57. Duration
- 58. Wind velocity
- 59. Average 9.9 m/sec; peak 28.0 m/sec
- 60. Method of restoration
- 61. Overlay, foundation mound, and consolidation blocks were replaced and repaired; shifted caissons were left as they were; places where fill came out were replaced and the compartment walls were reinforced with concrete where cracks had formed.

转声系统成果特

Sentence to the sent of the sent market to the first

waters when sevel as sociations.

被发售后平面因 数类售后平面因



98 ----

(系一人) 行政教育实验

长水水水 1.00世纪966

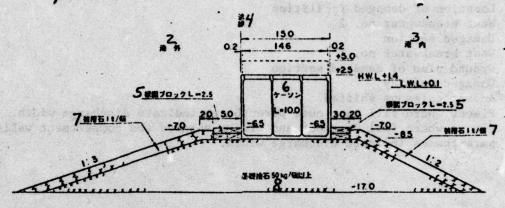
· 一个一个

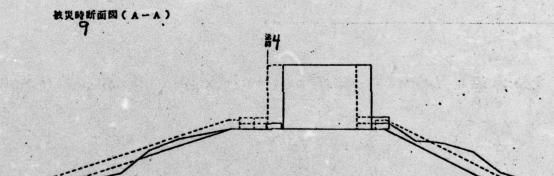
Key:

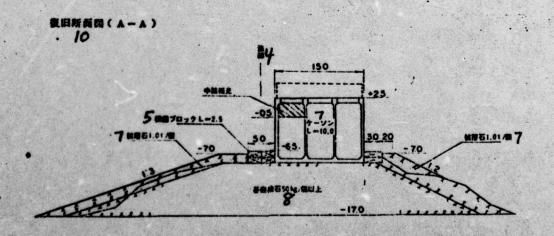
- 1. Location of damaged facilities
- 2. West breakwater no. 2
- 3. Damaged section
- 4. West breakwater no. 1
- 5. Ground plan of damaged section
- 6. Damaged overlay
- 7. Amount caissons shifted
- 8. Places where fill came out; parentheses indicate discharge width.
- Places where fill came out and cracks entered the compartment walls; parentheses indicate discharge width.

Contract to the second

被災前断顧図(A-A)





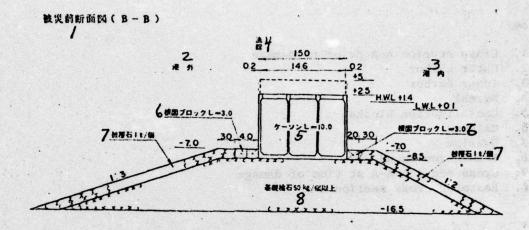


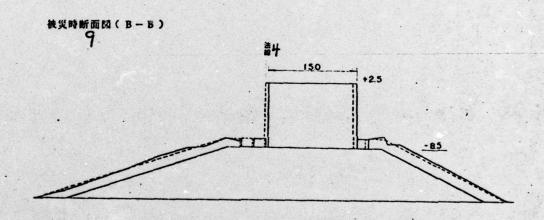
Key:

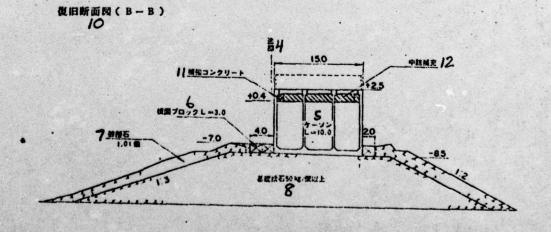
- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Normal
- 5. Consolidation blocks
- 6. Caisson
- 7. Overlay
- 8. Foundation mound
- 9. Cross section A-A at time of damage
- 10. Restored cross section A-A

-121-

在 中 中 上 特 是 性 所 来 ?







- 1. Cross section B-B prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Normal
- 5. Caisson
- 6. Consolidation blocks
- 7. Overlay
- 8. Foundation mound of more than 50 kg/piece
- 9. Cross section B-B at time of damage
- 10. Restored cross section B-B
- 11. Reinforced concrete
- 12. Fill added

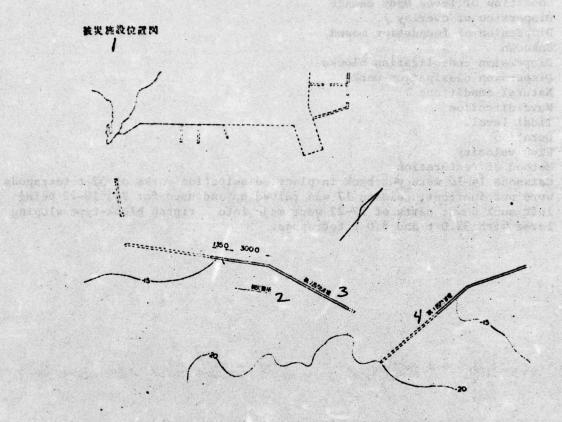
③ 小名浜港

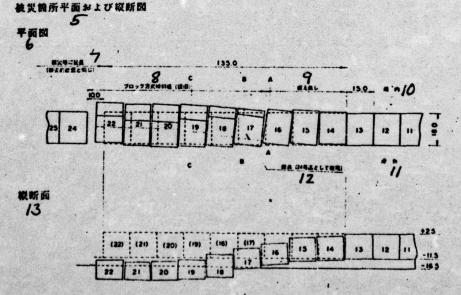
| 地 | 区施 | 段名 | 2第 2 | 西防波堤 | | B精造和 | 珠式 | ケーソ | ン式 | 混成堤 , | |
|----------|-------------|--------------|--------|--|-----------------------|---|--------------|-------------|--------|---------------------------------|--|
| 完成年月日 | | | T #6 | | 被災年月日 | 昭和47年1 | 月11- | ~13 | EIR | 9(低気圧 | |
| 被状 | 0 规 | 世, | 18号函 | より22号ま | では据え付けた | | および | 原地盤 | の中に | の1部を水面に見 にまで洗下し水面 被災を受けた。 | |
| 12 | 13 | | | 寸 /5 法 B H 18.0×14.0×15.0 例號 0.4 隔壁 0.2 底盤 0.6 /6 | | | | | | | |
| | 立 | 4-V× | | א-נו פלנב | | | | | | | |
| | 部 23 拾 | | | | | | | | | | |
| 被 | | | | 中 19 粒 | | 20 | 単位位 | 拉重加 | ł | 1.9 t/m² | |
| 災 | | | | ンクリート | 未施工2 | 2 | | | N/A | ensa data | |
| | | | 独 石 | 5 0kg/個以 | | | | | | | |
| | | | | | | | | | | | |
| | 石 | | | 港外内 2 B H L 2.0×1.5×3.0 | | | | | | | |
| | 都 | | 12 , 1 | t L 31 | | | | | | | |
| 前 | _ | 消费 | | | | | | | | | |
| | <i>33</i> + | 0 1 | t | ts L 31 | 1 | | | | | overki pe | |
| | 段 | 34' # 19 | 料 | 故 35 和 | | 1 m | 故 3 | | - | 幹 被37 | |
| | | 13 | | 月38 月42十八月 | | | 139 | | | β = 0° | |
| | 4/ 被 | /3 直 | | 90 カ ペ り 滑動はしないが据えた場所で基礎の中に沈下傾斜 10 画 43° | | | | | | | |
| 40 | 被 | 立部 | | 15 日 次 5 | | | | | | | |
| 被 | 災数量 | | | 破 ⁷ 角の状況 なし3/ ゴ ⁶ の 敷 乱 ─ | | | | | | | |
| | | 格器 | | 岩石 散 新 | | | | | | | |
| 災 | | | | 49,0000 | SO ASSISTANCE OF SOME | | | | | | |
| | | | | 100 N 8 | | | | | | | |
| | | 22 | | | | | | | | | |
| . | | 33 + 0 故 3 | | | H 1/3 = 6 | 82m(実測) | 周 3 | 2 1 | Я | 1 4.7 sec | |
| | 5 | 5/ 自然条件 茂 | | 35 高 S2 向 | N 1 3 2° | / | | 33 6 | + | + 1.2 8 m | |
| | - Zank | | | 55 MB 10 | 12h | | | 55 2 | 4- | 不明48 | |
| 被 | 56 周 方 | 推 | 1 4 · | ~16号例は抗 号級は引き扱け | 注意 1 日 | C 3 2 1 / 何テ C 使用、1 8~ t / 似かよび8. | トラボ: 22号: | ノトによ | トながーソン | 放工を設け、 が抗下したま | |

- 1. Regional facility name
- 2. West breakwater no. 2
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 11-13 Jan. 1972
- 9. Low pressure
- 10. Damage status
- 11. Caisson 13 with the upper concreting and overlay unfinished tilted, part of caisson 17 was visible at water level; in places fixed caissons 18-22 settled into foundation mound and original base and sank below water level. Therefore, the foundation mound, consolidation blocks, etc., were so damaged that they could not be restored to original condition.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.6
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Sand. Unit volume weight 1.9 t/m3
- 21. Upper concreting in site
- 22. Not done yet
- 23. Riprap part
- 24. Foundation mound
- 25. More than 50 kg/piece
- 26. Overlay
- 27. Not done yet (1.0 t riprap inside and outside harbor)
- 28. Consolidation blocks
- 29. Inside and outside harbor
- 30. Precast concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. No slippage but sinking and sloping of 10 caissons amid foundation where placed.

- 44. Levee body slope
- 45. Condition of levee body damage
- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Unknown
- 49. Dispersion consolidation blocks
- 50. Dispersion dissipation works
- 51. Natural conditions
- 52. Wave direction
- 53. Tidal level
- 54. Duration
- 55. Wind velocity
- 56. Method of restoration
- 57. Caissons 14-16 were put back in place; dissipation works of 32 t tetrapods were put in front; caisson 17 was raised up and used for 24, 18-22 being left sunk down; parts of 17-22 were made into a riprap block-type sloping levee with 32.0 t and 8.0 t tetrapods.

The start bold was a start





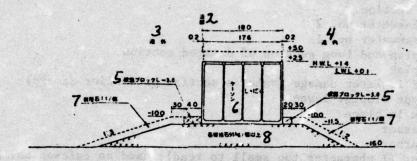
Key:

- 1. Location of damaged facilities
- 2. Damaged section
- 3. West breakwater no. 2
- 4. West breakwater no. 1
- 5. Ground plan and long section of damaged section
- 6. Ground plan
- 7. Extended in later damage (same as section of earlier damage)
- 8. Block-type sloping levee
- 9. Put back in place
- 10. Inner harbor
- 11. Outer harbor
- 12. Taken out (? character too small to read); used as caisson no. 24
- 13. Long section

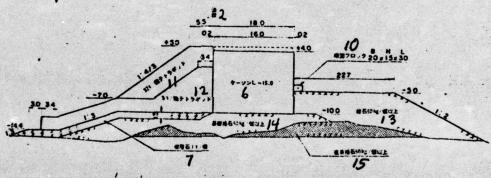
white we.

33 小名英港

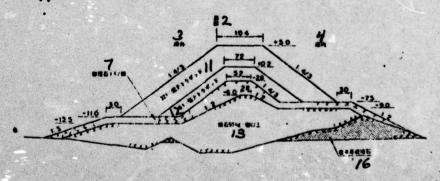
被災前断而図



復旧断面図(A-A)



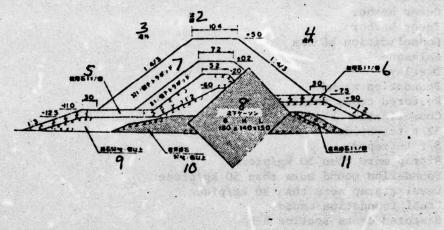
復旧新面図(B-B)



- 1. Cross section prior to damage
- Normal
- 3. Outer harbor
- Inner harbor
- 5. Consolidation blocks
- Caisson 6.
- 7. Overlay
- 8. Foundation mound
- 9. Restored cross section A-A
- 10. Consolidation blocks
- 11. 32 t tetrapods
- 12. 8 t tetrapods
- 13. Riprap more than 50 kg/piece
- 14. Foundation mound more than 50 kg/piece
- 15. Usual riprap more than 50 kg/piece 16. Usual foundation mound 17. Restored cross section B-B

③ 小名英卷

後旧断面図(C-C)



Onahama Harbor

Key:

- Restored cross section C-C
- 2. Normal
- Outer harbor 3.
- Inner harbor
- 1 t overlay
- 1 t overlay 6.
- 32 t tetrapods
- Sunken caisson 8.
- Riprap more than 50 kg/piece
- Usual riprap more than 50 kg/piece 10.

was appeared and appropriate abuse of

B'WELLEY TO SELECTE AND

A STATE OF THE STA

Usual riprap more than 1 t/piece 11.

| 地 | 凶 施 | 1 | | 地区南防波坝 | , | 造株式 4ケーソン | | | |
|--------|--------------|--------|------------------------------------|----------------------|--|---------------------------|--|--|--|
| 完成年月日 | | 6昭和 | 日和46年12月5日 7次災年月日 8日和47年1月12日 9(低気 | | | | | | |
| 被状 | の説 | th | に伴う根 | 固プロックの抗 | に亘って,総外側被覆コン 下敵乱,継内側被覆石の制 災があった。 // | クリートプロック 乱があった。また | および基礎指石飲乱 との区間内でケーソ | | |
| • | 13 | | IL | す 15 株 コンパート | JE 17.0×17.0×1 | L 5.0 何壁 0.4 月 | 5壁 0.2 底盤 0.6 /6 | | |
| | 立 | 7- | עע"י | # 18 B | 85.0kg/m² SD3 | 0 1/4 | udelatet (1991) Jerro (1991) | | |
| 12 | 都 | | | ф 19 tt | v 20 | 単位体積重量 | 2.0 t/m² | | |
| | | 上部 | 場所打 | ンクリート | σ ₂₄ = 1 8 0 kg/αd | i sada eyen | general Law | | |
| | 22 | 基础指石 | | 200~500 | ks/他24 | | | | |
| 爽 | 捨 | 彼 | \$2 I | | 個コンクリートプロック 港内、拾石500~600kg/個 26 | | | | |
| | 5 | | 37,, | 港外内 2% | P H L 4.5 × 1.5 × 2.0 | | | | |
| | 都 | 前故子2,力 | | te 130 | | | | | |
| 韵 | | Mi | 2 特 石 | te \ 30 | | | | | |
| | 32× | | | なし30 | | | | | |
| | 120 | 33 | E 141 | 故 34 高 | H 1/3 = 6.0 m | 枝 35 旺 | H. I 区阶被 3 | | |
| | | 13 | T | 周 37 期 | 1 4 sec | 人38射 角 | β = 0° | | |
| | 40 | 13 提件 | | 72 | | | | | |
| F | | 部 22 | · · | 関係の状況 | 12 L 30 | | | | |
| 被 | 类 | | * 5 | 45 N A | | 0.000㎡ 港内。 | 延長 1,1 00m 1 0,000m² | | |
| | 数: | 檢 | 2. 00 | #6 m at | | .0 0 0m² 48 | | | |
| 类 | 1 | 石根 | 根因プ | 49,08 & | 不 明 SO | | | | |
| | - | | 部 | 椭鼓 | ≨ 10 数 数 | - | | | |
| | | 32 | ŧ . | o flu | | | | | |
| 助 | 1 | 72 | 被 | 34 🛎 | H 1/3=7.0 m (框算) | 周 37 期 | 1 4.0 sec | | |
| | 2 CONSCIONAL | 自然条件 改 | | 54 向 | E | # SS to | | | |
| | | | 粒 | 統56時 間 | 5 h | 服 57 速 | 平的 ENE 18.3 m/sec 跨級 ENE 21.6 m/sec | | |
| æ , | 59 旧方 | tt. | /低 | 物石でそれぞれ。 些内側を500・ | 災害とし、港外側は8 t/(装削しを後回し、残り90~600は/倒拾石で装設 の多数直し、残り19前は | 0 mは港外側を 6.: 工を復旧した。移り | 3 1/間テトラポッ | | |

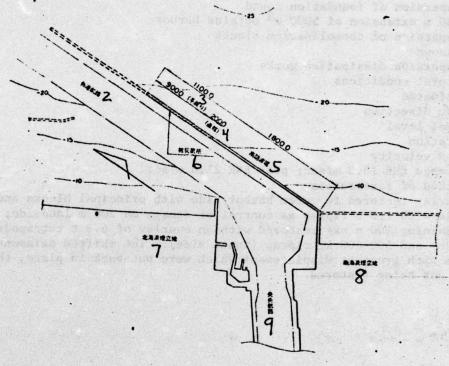
Key:

- 1. Regional facility name
- 2. South breakwater (district outside harbor)
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 5 Dec. 1971
- 7. Date damaged
- 8. 12 Jan. 1972
- 9. Low pressure
- 10. Damage status
- 11. Damaged sections H, I, and J were overreached on their entire extension and the concrete blocks and foundation mound on the outer harbor side dispersed, resulting in subsidence of consolidation blocks and dispersion of overlay on inner harbor side. Twenty caissons within this section shifted and were destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.6
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Sand. Unit volume weight 2.0 t/m³.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. 2.3 t concrete blocks outside harbor; 500-600 kg riprap inside harbor
- 27. Consolidation blocks
- 28. Both inside and outside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation works
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. H, I sections: breakers; J section: partial breakers.
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 20 caissons, maximum 4.74 m
- 43. Levee body slope

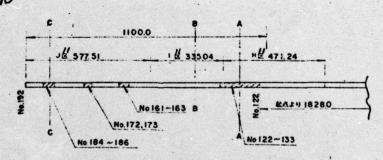
- 44. Condition of levee body damage
- 45. Dispersion of overlay
- 46. 1100 m extension of 20,000 m³ outside harbor; 1100 m of 10,000 m³ within harbor
- 47. Dispersion of foundation mound
- 48. 1100 m extension of 5000 m³ outside harbor
- 49. Dispersion of consolidation blocks
- 50. Unknown
- 51. Dispersion dissipation works
- 52. Natural conditions
- 53. Estimated
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Wind velocity
- 58. Average ENE 18.3 m/sec; peak ENE 21.6 m/sec.
- 59. Method of restoration
- 60. Overlay restored to outer harbor side with principal blocks and to inner side with 1.0 t riprap as control of damage on 200 m landside; the remaining 900 m was restored with an overlay of 6.3 t tetrapods (outer side) and 500-600 kg riprap (inner side). The shifted caissons included 185 with greatest displacement which were put back in place, the remaining 19 not being restored.

telreso to gotavejeri





被災箇所平面図 10



| 13 | 14 | 134-1 | 20 HH 14 | 12 | 14 | |
|--------|-------------|--------|------------|--|-----------|----------|
| ケーソンル | 15 &: R | ケーソンカン | 1 H & R | ケーソンル | 1 1 7 | 7 |
| No 122 | 024 ~ 0.32 | No 129 | 1.42 ~1.44 | No 163 | 032 ~ 036 | + |
| 123 | 036 ~ 040 | 130 | 1.47 ~ 154 | E SERVICIONI DE LA CONTRACTOR DE LA CONT | 013 -017 | |
| 124 | 033 ~ 038 | 131 | 173 -181 | CONTRACTOR DESCRIPTION OF THE PARTY OF THE P | 028 ~ 028 | The late |
| 125 | 1.15 ~ 1.16 | 132 | 1.31 ~1.26 | 184 | 050-045 | |
| 126 | 105 ~ 107 | 133 | 048 - 045 | 185 | 474 - 471 | # ARL 15 |
| 127 | 096 ~1.00 | 161 | 025 - 031 | 186 | 018-023 | 1 |
| 128 | 0 99 ~ 1.14 | 162 | 033 - 032 | | 1010 523 | |

PORT AND HARBOUR RESEARCH INST TOKYO (JAPAN)
DISASTERS OF BREAKWATERS SY 11 VE ACTION (2).(U)
MAR 75 H TAKEYAMA, T NALAYA.4A
TN-200 ACSI-K6472 AD-A036 006 F/G 13/2 UNCLASSIFIED NL 40F**6**AD36006 40 The WA



A. A. A. S. P. 自然及其 ...

0.表一人/ 2000 移出者

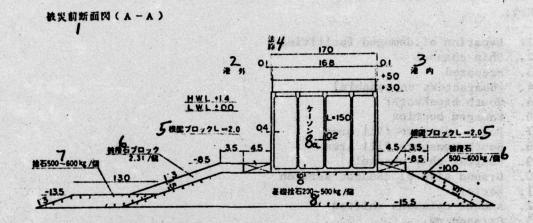
Key:

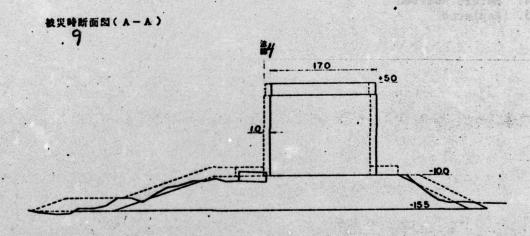
- 1. Location of damaged facilities
- 2, Ship channel
- 3. Prepared
- 4. [Characters unreadable]
- 5. South breakwater
- 6. Damaged section
- 7. North seashore fill area
- 8. South seashore fill area
- 9. Central ship channel
- 10. Ground plan of damaged section
- 11. Sector
- 12. Amount caissons shifted
- 13. Caisson no.
- 14. Meters shifted
- 15. Replaced

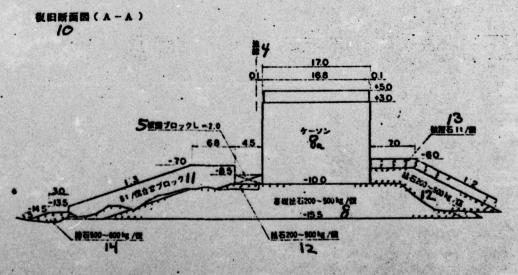
et aven or proba

28 years again.

第10 对 SEE





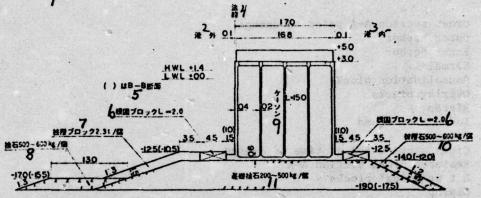


Key:

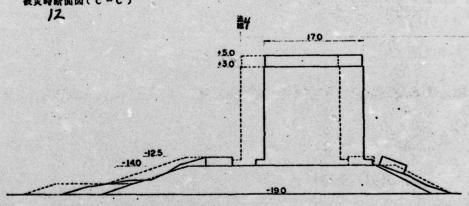
- Cross section A-A prior to damage
- Outer harbor
- Inner harbor
- Normal
- Consolidation blocks 5.
- Overlay blocks
- 7. Riprap
- 8. Foundation mound
- 8a. Caisson
- 9. Cross section A-A at time of damage
- 10. Restored cross section A-A
 11. 8 t principal blocks
- 12. Riprap
- 13. 1 t overlay
- 14. Riprap

A CONTRACTOR

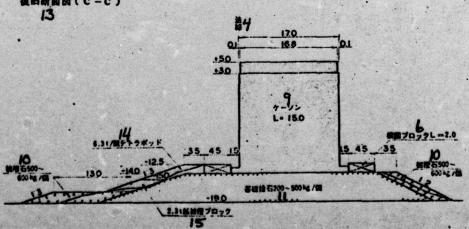
被災前断面図(C-C)



被災時断面図(C-C) /
ス



復旧新顧閔(C - C) 13



Key:

- Cross section C-C prior to damage
- Outer harbor
- Inner harbor
- () is the B-B cross section
- Consolidation blocks
- Overlay
- Riprap
- 9. Caisson
- 10. Overlay
- Foundation mound 11.
- Cross section C-C at time of damage 12.

X Latter to the second of the

the fire will the wife and her been placed that and the fire of

throwing it is a state of the

A A WARRY OF STREET AND

REMARKS AND THE CONTRACT OF TH

- Restored cross section C-C 13.
- 14. 6.3 t tetrapods
- 15. 2.3 t overlay

The Parket of the Control of the Con

| 枚 /0 | 英 | | | | 12月24日 | 9(低级胜) | | | |
|------|---------------------------|----------|--------------|--|---------------|--------------------------------------|--|--|--|
| П | 82 | すべて移動 | に意外側被覆ガン | で、この区域のケーソン1マエル、港内側被復石およ動したケーソンが点在した | び茶礎石が散乱し | | | | |
| | 13 | | す 15 株 | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 何壁 0.4 隔壁 0.2 | 底盤 0.6 /6 | | | |
| | 立 | 214,2 | # 18 W | | | | | | |
| 12 | 都 | | ф 19 M | v 20 | 単位体務重量 | 2.0 1/18 | | | |
| | | | コンクリート | σ ₂₈ = 1 8 0 kg/αñ | | A SETTING | | | |
| | 22 拾 | E E 74 | 百 200~500 | k9/假24 | 3-14 3-3 o | | | | |
| 英 | 12 | | | | | | | | |
| | 石 | 根間子了, | | 港外内 と B H L 4.5 × 1.5 × 2.0 | | | | | |
| | 都 | 前肢另一, | | | | | | | |
| 69 | | 前 被指 | | | | | | | |
| | 32 七 の 他 33 股 計 資 料 | | | ta U 30 | | | | | |
| | | | 技 34 高 | H 1/3 = 6.0 m | 被 35 E | 部分砕改 34 | | | |
| - | | 721 | 月 37 期 | 1 4 sec | 入38射 角 | β = 9 0° | | | |
| | 40 | | * 41 + ~ b | 10函,最大 3.8 3 m 42 | | | | | |
| 34 | 被 | | 体记 植 解 被 被 放 | t 130 | | | | | |
| 34 | 英 | | | な し30 巻外, 延長150m, 10 | A H State Br | B150- 520- | | | |
| | 數 | 22. 被 8 | 2 1 2 数 和 | | | RIJUM, JJUM | | | |
| | | <i>F</i> | プリクの教乱 | | | | | | |
| 英 | | | BD | TO M S. | | | | | |
| | | 32 t | 0 他 | | | | | | |
| | | | 34 15 | H 1/3=7.0m (推算) | 局 37 期 | 13m | | | |
| | 自然条件 故 | | | ESE~ENE | m 54 to | | | | |
| | | | | 2 h | B 56 ≥ | 平均 NNE 22.6m/sec 序址 NNE 29.2m/sec | | | |
| | 28. | # | 外側被後1は天魄 | と 0.9 m高くして 1 0 t/f くして 1.0 t/個 拾石にて | カナラポットに | て復旧し港内保装度 | | | |

Key:

- 1. Regional facility name
- 2. South breakwater of outer harbor district
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 24 Dec. 1972
- 9. Low pressure
- 10. Damage status
- 11. Main place damaged was 150 m of section K; 10 caissons were partially built but all shifted and the outer harbor side overlay "canmael" and inner side overlay rock and foundation mound dispersed. About 1100 m on landside was overreached and displaced caissons scattered about.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 0.6
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Sand. Unit volume weight 2.0 t/m3
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. 5.0 t "canmael" outside harbor, 1.0 t riprap inside harbor
- 27. Consolidation blocks
- 28. Both inside and outside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Partial breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 10 caissons, maximum 3.83 m
- 43. Levee body slope

- 44. Condition of levee body damage
- 45. Dispersion of overlay
- 46. 150 m extension of 100 m outside harbor; 150 m extension of 530 m inside harbor
- 47. Dispersion of foundation mound
- 48. 150 m extension of 2000 m³ inside harbor
- 49. Dispersion of consolidation blocks
- 50. Dispersion of dissipation works

STR TRI

27 2 1864

100

EXE.

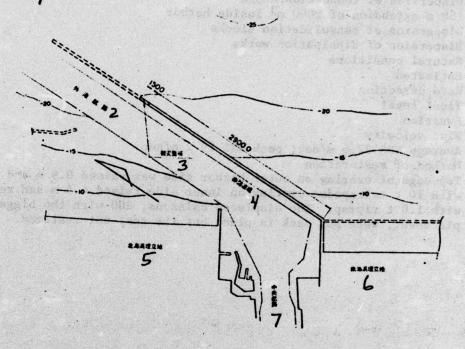
- 51. Natural conditions
- 52. Estimated
- 53. Wave direction
- 54. Tidal level
- 55. Duration
- 56. Wind velocity
- 57. Average NNE 22.6 m/sec; peak NNE 29.2 m/sec.
- 58. Method of restoration
- 59. Top edge of overlay on outer harbor side was raised 0.9 m and restored with 10 t tetrapods; overlay on inner side raised 4.5 m and restored with 1.0 t riprap. The displaced caissons, 200 with the biggest displacement, were put back in place but the rest not restored.

AL AREA TO SEE

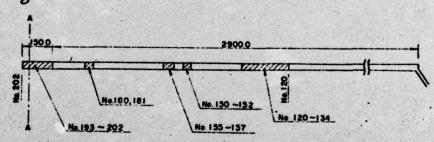
FB1 (200 200)

\$165 \$ \$ (C.S.)

被災施設位置図







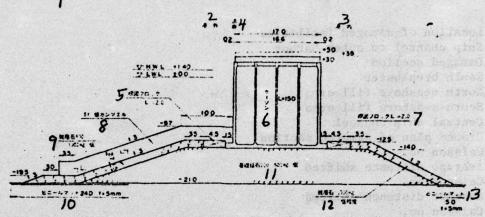
| ーゾンル | 移動數(平均) | クーソンル | 46 8 3 m | ケーリンセ | Se'# (#17 | 743 | 格特B/(基均 |
|------|---------|--------|----------|--------|-----------|--------|---------|
| 120 | 0.13 | No 128 | (0.36) | No 151 | 0.09 | No 194 | 1.09 |
| 121 | 009 | 129 | (015) | 152 | 0.09 | 195 | 057 |
| 122 | (0.03) | 130 | (047) | 155 | 0.30 | 196 | 0.38 |
| 123 | (004) | 131 | (022) | 156 | 035 | 197 | 0.15 |
| 124 | (0.03) | 132 | (002) | 157 | 044 | 198 | 0.97 |
| 125 | (0 25) | 133 | (007) | 180 | . 0.15 | 199 | 1.23 |
| 126 | (027) | 134 | 014 | 101 | 0.15 | 200 | 303 |
| 127 | (0.04) | 150 | 010 | 193 | 0.97 | 201 | 0.75 |
| | | | | | | 202 | 0.40 |

Key:

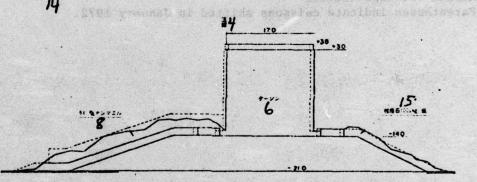
- 1. Location of damaged facilities
- 2. Ship channel to outer harbor
- 3. Damaged section
- 4. South breakwater
- 5. North seashore fill area
- 6. South seashore fill area
- 7. Central ship channel
- 8. Ground plan of damaged section
- 9. Caisson no.
- 10. Average distance shifted
- 11. Caisson no.
- 12. Average distance shifted
- 13. Caisson no.
- 14. Average distance shifted
- 15. Replaced
- 16. Amount caissons shifted
- 17. Parentheses indicate caissons shifted in January 1972.

《本一本》即杨建四号

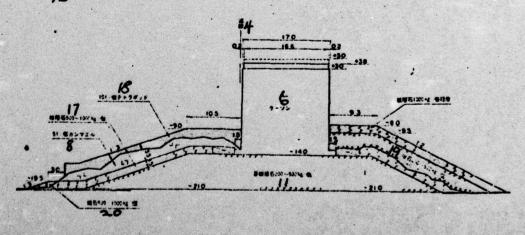
被災前断面図(A-A)



被災時断面図(A-A) 14



復旧断面図(A-A)



Key:

- Cross section A-A prior to damage
- Outer harbor
- 3.
- 4. Normal
- 5. Consolidation blocks
- 6. Caisson
- Consolidation blocks 7.
- 5 t "kanmael" 8.
- 9. Overlay
- 10. Vinyl mat
- Foundation mound 11.
- 12. Overlay
- 13. Vinyl mat
- Cross section A-A at time of damage 14.

不知 自然 上班 日本年 山田本文公園 社会

CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR THE FIRST OF THE STATE OF THE S

- 15. Overlay
- 16. Restored cross section A-A
- 17. Overlay
- 18.
- Overlay 10 t tetrapods 200-500 kg riprap 19.
- 20. 500-1000 kg riprap

| 完成年 被 状 | 月日 | L8370 | | | | 様式 4ケーソン | | | | |
|-------------|------|-------|--------------------------------|--|-------------------------------------|--------------------------------------|---------------------|--|--|--|
| 10 | | 0 | 46年1 | 2月25日 | 被災年月日 8四和47年1 | 月11~12日 | 9(低级压 | | | |
| | が、元 | 上り | 落ち傾斜 | | ソン10畝のうち, 9畝が移港内側投復石, 菸礎石, 根島 // | | | | | |
| | 13 | | | 寸 <i>15</i> 株 | B H L 10.0×8.0×10.0 例 | .0 侧壁 0.4 隔壁 0.4 底盤 0.5 16 | | | | |
| | | 1 1 | 4,, | コンクリート | R 2 4 2 D | · 54 | ibuasa" i. c | | | |
| 12 | 立 | | | # 18 B | t 18 15 54.35kg/m³ | | | | | |
| 被 | 部 22 | | | 中19 結 | 碎石50%以下 20 | 单位体積重量 | 1.6 t/出 -空中 | | | |
| | | | | ンクリート | R 1 6 4 A | | Taker Jynary | | | |
| | | 器 品 | 74 石 | 5 0 kg/偏内外 | 24 | Santa II poli is for an object of in | | | | |
| 災 | 拾 | | K I | 港外,捨石 2.0 | 0 t/倘 港内, 拾石 1.0 t/個 26 | | | | | |
| | 石 | 根固 | 36,0 | 勝外内 ²⁶ B H L 2.0×1.2×2.0 | | | | | | |
| | 部 | 消波 | 前被 ³ 4-10 な L30 | | | | | | | |
| 前 | | 相被 | 列拾 石 | ts L30 | | | | | | |
| | 32 t | Ø f | t | ts 130 | | | | | | |
| | | 及并资料 | | 被 34 高 | H 1/3 = 3.5 m | 被 35 胜 | 种故 36 | | | |
| | K | at M | 44 | 周 37 期 | 9.0 sec | 入38射 角 | 不 明39 | | | |
| | | 13 | | 82 7 ~ 9 | 9函,最大15.5m 43 | | | | | |
| | 州被 | 部 22. | 堤 体 | 4名 特 科 | 21° | | | | | |
| 40 | 炎 | | 提体 | 明祖 の状況 | ts 130 | | | | | |
| | î | | 被极 | 拉的 散乱 | 港外, 既長 70.4m, 数量 | 下明 港内,延長 | 100.8m, 727.5m | | | |
| | 數 | 拾石 | * * | 松の散乱 | 延長20m. 443㎡ 49 | | | | | |
| 炎 | 4 | 部部 | 根因ブ | \$0,00 m 乱 | 卷外, 延長28.0 m, 386 | 郡内,なし、 | ा | | | |
| | | | 俏被 | 至30 数 & | 5t — | | | | | |
| | | 32 | t | の 他 | | | | | | |
| 14 | | . 2 | 被 | 34 TG | Hmax = 7.0 at (日間) | 用 37 期 | 不明39 | | | |
| | 53 战 | | 55 向 | 不 939 | m 56 to | + 1.4 m | | | | |
| | | | R.S. | \$57的 PA | 不明39 | ₩ 58 速 | N~NNE 12~17m/sec | | | |
| | | | \$3750000000 a \$20 a \$10 000 | COLD DE SINO, OFFICE AND ADDRESS AND ADDRE | 大きく移動した先端の2輌を | | 間被災箇所は原形包 | | | |
| W IF | 59 | 拉 | 161, | 港外側は被災区 | 間全延長に見って12.5 t/ | 値 テトラポット | にて前波工を設けた。 | | | |



36. Atami Harbor

Key: 1. Regional facility name 2. East breakwater 3. Construction method Caisson composite breakwater 5. Date completed 6. 25 Dec. 1971 7. Date damaged 8. 11-12 Jan. 1972 Low pressure 10. Damage status 11. 100.82 m damaged; 9 of 10 caissons displaced, in particular 2 on the cusp fell from mound and tilted. Therefore the overlay rocks, foundation mound, and consolidation blocks on inner harbor side dispersed. Overlay and foundation mound on outer harbor side also dispersed. 12. Prior to damage 13. Vertical part 14. Caissons 15. Dimensions Sidewall 0.4, compartment 0.4, base plate 0.5 16. 17. Concrete 18. Reinforcing steel 19. Fill 20. Less than 50 m/m broken stone. Unit volume weight in air 1.6 t/m^3 21. Upper concreting in site 22. Riprap part 23. Foundation mound 24. About 50 kg/piece 25. Overlay 26. 2.0 t riprap outside harbor; 1.0 t riprap inside harbor 27. Consolidation blocks 28. Both inside and outside harbor . 29. Precast concrete armor units 30. None 31. Wave dissipation riprap 32. Other 33. Design data

34. Wave height

37. Period

39. Unknown

Wave pressure Breakers

38. Angle of incidence

40. At time of damage 41. Amount of damage 42. Levee body slide

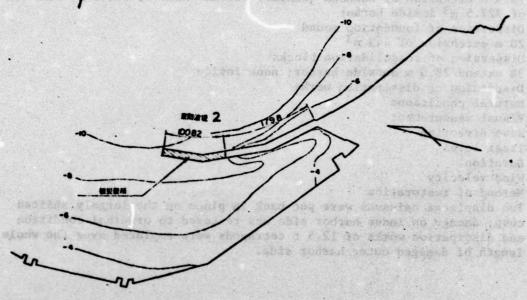
35.

36.

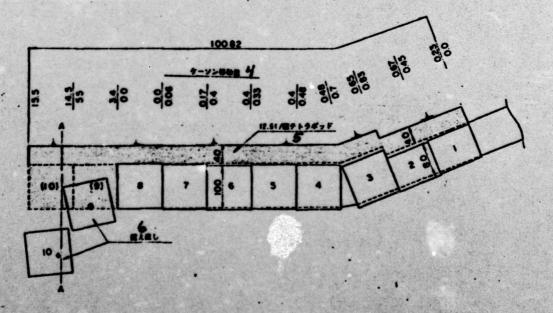
- 43. 9 caissons, maximum 15.5 m
- 44. Levee body slope
- 45. Condition of levee body damage
- 46. Dispersion of overlay
- 47. 70.4 m extension of unknown quantity outside harbor; 100.8 m extension of 727.5 m³ inside harbor
- 48. Dispersion of foundation mound
- 49. 20 m extension of 443 m³
- 50. Dispersion of consolidation blocks
- 51. 38 extend 28.0 m outside harbor; none inside
- 52. Dispersion of dissipation works
- 53. Natural conditions
- 54. Visual measurement
- 55. Wave direction
- 56. Tidal level
- 57. Duration
- 58. Wind velocity
- 59. Method of restoration
- 60. Two displaced caissons were put back in place on the largely shifted cusp; damage on inner harbor side was restored to original condition and dissipation works of 12.5 t tetrapods were emplaced over the whole length of damaged outer harbor side.

Treat the second and the second

被災施設位置因



被災領所平面間



36. Atami Harbor

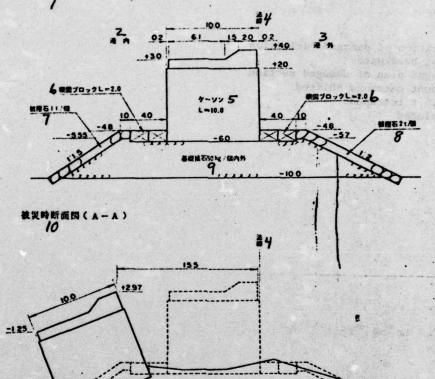
Key:

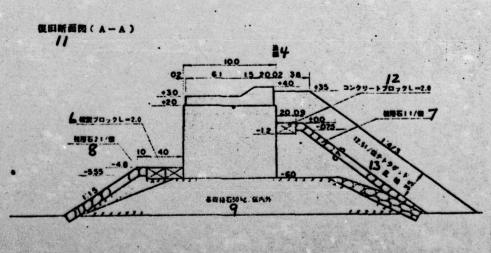
- 1. Location of damaged facilities
- 2. East breakwater
- 3. Ground plan of damaged section
- 4. Amount caissons shifted
- 5. 12.5 t tetrapods
- 6. Replaced

- 数1---

14 . 64







36. Atami Harbor

Key:

- Cross section A-A prior to damage
- Inner harbor
- Outer harbor
- Normal
- Caisson
- Consolidation blocks
- Overlay
- Overlay
- Foundation mound
- Cross section A-A at time of damage 10.

- Restored cross section A-A
- Concrete blocks
- 13. 12.5 t tetrapods

PE Carrenal mer

1. 16 网络

- 201

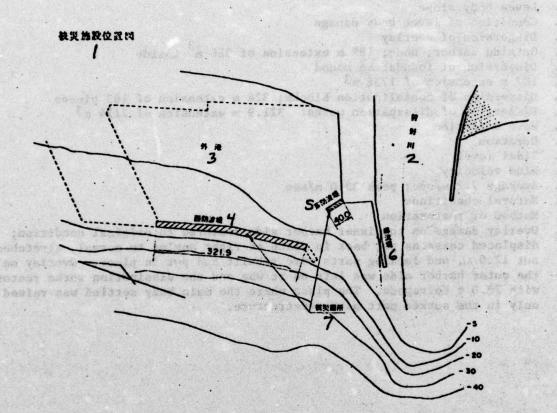
TITLE ON THE SHOPE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF DEEKSATTROBT (本本、大小田園本)(100年) (100年) (100年)

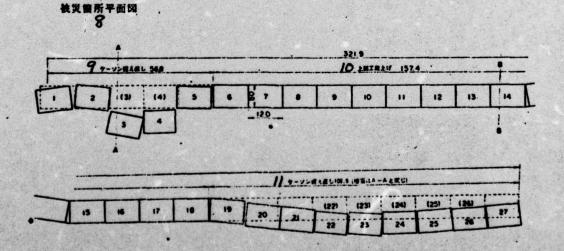
| | | | 2外程 | 西防被堤 | | , | 試 47- | | 式程成堤 ———————— | | |
|-----|------------|---------------------|--|----------------------------|----------|--|----------|-----------|-------------------------------|--|--|
| | | | 和40年3月25日 7歲炎年月日8州和40年9月17~18日 9(台風24号 | | | | | | | | |
| 被状状 | 10 炭 | #L | た。移動 | しなかった | 7- | 14繭が移動し、特に3、4 ソンも全部化下し、前面消波 かなりの延長に亘り被災した。 // | テトラポッ | | | | |
| | 13 | | | † 15 | 祛 | B H L B M () 例像 (| 0.2~0.4 | 0 型点 | 2 底盤 0.4 化 | | |
| | | 11/1 = | | コンガー | - > | | | | | | |
| 12 | 立 | | | # 18 | 15 | 106.5kg/m³ SS41 | | | | | |
| 被 | 部 | | | | 结 | | 単位体積 | RE | 1.81/1 -空中 | | |
| | | | | シクリー | | 不明2/ | 143 Proc | âu. | 72 10 10 10 10 | | |
| | 22. | | 基 配 50~200kg/似24 | | | | | | | | |
| 災 | | 被 | | 港外内と 港内 B 港内 2.0 | 6. 1 | 拾石 1.0 t/健以上 2 6 H L 1.0×2.0 | | | | | |
| | 75 | Section (Control of | 76,, | | | | | | | | |
| | 部 | | 39., | , | | | | | | | |
| 柳 | | | 治 石 | | | | | | | | |
| | 33+ | 0 1 | t | h L 32 | | | | | | | |
| | R | 24 股計資料 | | 数 35 | | | 故 36 | Æ | 砕 被37 | | |
| | | <u> </u> | | N 38 | 期 | 1 2 sec | 入39村 | 角 | β = 3 0° | | |
| | 4/数 | | | 42+ ~ | b | 14函,最大9.6m 43 | | | | | |
| 40 | 被 | 郑 模 27 被 | 提 体 | | 料 | 30° | | | | | |
| 被 | 英 | | | 数据の状 | Negative | # L32 | | | c 1 (17) | | |
| | 83 | | | 460 数 | TO EUI | · | 長182m, | 98 | om 7/ | | |
| | | 前被王向教司 | | | | | | | | | |
| 拠 | 1 | | | 子 の 散 乱 延長324m, 163個型 | | | | | | | |
| | | | | 1838 32 1.9 m. 2.12 4 m 24 | | | | | | | |
| | | 57 R | | o 他 | NS . | H 1/3=5.42m (突側) | m 38 | M | 17.9 sec | | |
| 14 | 5 | | | | n) 向 | 不 9 2/ | m 54 | | +1.88m | | |
| | - | | 数数 | - 62 | | 不明21 | m 57 | NEW TOTAL | 平台 7.2m/kx 56 四位 33.0m/set 56 | | |
| | 1 | | | | | 石は原形和旧、移動したケー | | | | | |
| 複 | 58 16 5 | 扶 | 20. | て据え取し. | トラ | 日は原形では、おかしたター 足分は新たに製作館え付けた。 ボッドにより荷茂工を製出し、 けした。 59 | 。他外侧被 | 度部分 | けはそのままにして | | |

Key:

- 1. Regional facility name
- 2. Outer harbor west breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 25 Mar. 1965
- 7. Date damaged
- 8. 17-18 Sept. 1965
- 9. Typhoon No. 24
- 10. Damage status
- 11. Of the 321.9 m in the damaged sector, 14 caissons shifted and in particular 3 and 4 were pushed in the middle of the mound and tilted. The caissons not displaced also settled; the entire length of the front dissipating tetrapods were overreached and dispersed. Some of the overlay on the inner harbor side was also overreached and damaged.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.2-0.4, compartment wall 0.2, base plate 0.4
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Gravel. Unit volume weight 1.8 t/m3 -- in air
- 20a. Upper concreting in site
- 21. Unknown
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay
- 26. Riprap more than 1.0 t per piece inside and outside harbor
- 27. Consolidation blocks
- 28. Inside harbor
- 29. Precast concrete armor units
- 30. 8.0 t tetrapods
- 31. Wave dissipation riprap
- 32. None
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage

- 42. Levee body slide
- 43. 14 caissons, maximum 9.6 m
- 44. Levee body slope
- 45. Condition of levee body damage
- 46. Dispersion of overlay
- 47. Outside harbor, none; 182 m extension of 986 m inside
- 48. Dispersion of foundation mound
- 49. 187 m extension of 1738 m³
- 50. Dispersion of consolidation blocks; 324 m extension of 163 pieces
- 51. Dispersion of dissipation works: 321.9 m extension of 2124 m³
- 52. Wave direction
- 53. Duration
- 54. Tidal level
- 55. Wind velocity
- 56. Average 7.2 m/sec; peak 33.0 m/sec
- 57. Natural conditions
- 58. Method of restoration
- 59. Overlay damage on the inner harbor side restored to original condition; displaced caissons put back in place at right angles to normal, stretched out 12.0 m, and lacking parts were rebuilt and put in place. Overlay on the outer harbor side was left as it was and the dissipation works restored with 20.0 t tetrapods. The place where the main body settled was raised only in the sunken part as superstructure.





37. Numazu Harbor

"在本一人",但但这种关系

也是一大工程是我用的

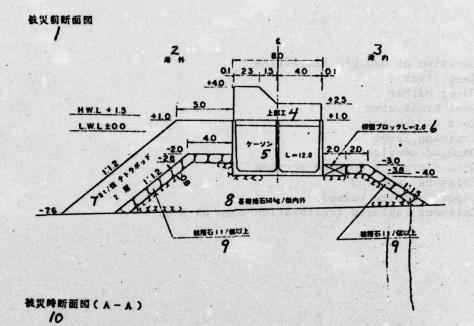
Key:

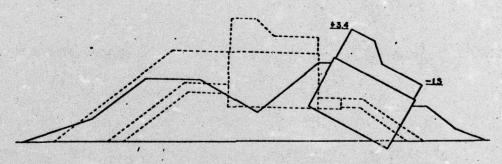
- Location of damaged facilities
- Kano river
- Outer harbor
- 4. West breakwater
- 5. East breakwater
- 6. Training levee
- 7. Damaged section
- 8. Ground plan of damaged section

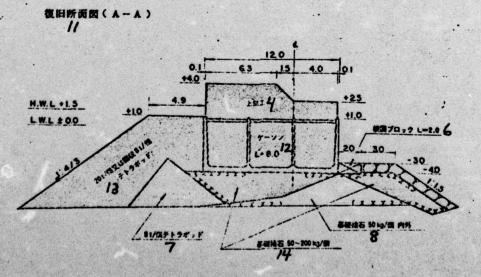
A STREET STREET, STREE

Managh North

- 9. Caissons replaced
 10. Superstructure raised
 11. Caissons replaced (restoration same as A-A)





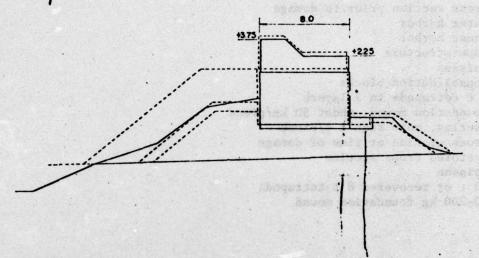


37. Numazu Harbor

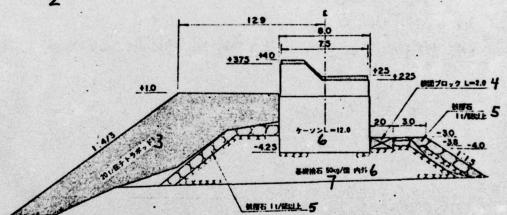
Key:

- 1. Cross section prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Superstructure
- 5. Caisson
- 6. Consolidation blocks
- 7. 8 t tetrapods in 2 layers
- 8. Foundation mound, about 50 kg/piece
- 9. Overlay, more than 1 t/piece
- 10. Cross section at time of damage
- 11. Restored cross section
- 12. Caisson
- 13. 20 t or recovered 8 t tetrapods
- 14. 50-200 kg foundation mound

被災時断而図(B-B)



復旧断面図(B-B)



37. Numazu Harbor

are the decimal and the second

等。在12. 多种在家里的时候的J

在是中心中的自然的 \$48.49的数字。 图 @ \$1\$9

STATE OF BUILDING

. MARKO MARKA

Mark the All Street Powers in

传送:

THE RESERVE

1 4 9 9 x 9 , 1 0 ...

SH was all the fact of the fact PACES DATE OF STREET

Key:

- Cross section B-B at time of damage
- Restored cross section B-B
 20 t tetrapods
- Consolidation blocks
- Overlay more than 1 t/piece 5.
- 6. Caisson
- Foundation mound about 50 kg/piece

N m m tha to m

on a state of the sound of the

MANY MESSAGES

white the profession of the same of the same

(大学をようなもの)サードでするがいかかん

30

| 地区 | X 推 | 设名 | 2外港 | 東防波堤 | | 8構造様式 4ケーン: | >式混放堤 | | | |
|------|------------|--|-------------------|-------------------------------------|--|---------------------------|---------------------|--|--|--|
| 完成年 | 月日 | 6昭和 | 36年3 | 月25日 | 7被 災年月日 3 昭和 4 | 0年9月17~18日 | 9(台级24号) | | | |
| 教人 | 》 税 | び出 | し転倒し | to Entt! | 0.4 mで、うち2歳が移り、港内領被復石および ア先端巻止の80 t/協 // | 根間プロックが散乱し | た。また、前面消波 | | | |
| | 13直立部 | *-14 *-22 | | す 15 法 | B H L L S S S S S S S S S S S S S S S S S | | | | | |
| | | | | # 18 m | | | | | | |
| 12 被 | | | | ф 19 tt | | | | | | |
| | | | 77.00 | レクリート | 1:3:6 | | | | | |
| | 22 拾 | 蓝 牌 店 石 | | 50~200kg/樹2y | | | | | | |
| 災 | | | 25 J. | 港内,拾石 2 | | | | | | |
| | Æ | The shortest and | | 76。 | | | | | | |
| 80 | 部 | 俏皮了 ²⁸ ,夕 梢 被 拾 石 | | 5.0 1/個テトラポッド 28a | | | | | | |
| | 212 | 有数指右 | | な し30 先端巻it 6.0 t/個テトラポッド32 | | | | | | |
| | 310 | 33 | | 故 34 点 | 1 | ± 35 € | 种 故 36 | | | |
| | R | H A | 料 | M 37 W | | . 入38射 角 | | | | |
| | | 13 提供 | | 8' + ~ b | 2函,最大150m 42_ | | | | | |
| | 40 | 立部 22 拾石部 | 提体 | 43 # # | 90°(転倒)44 | | | | | |
| 39 | 災 | | The second second | 数据 0 状况 | te 146 | | | | | |
| | 数位 | | | 生70 数 新 | 不明48 | | | | | |
| | | | 基礎 490 散乱 | | 本 明 48 | | | | | |
| 爽 | | | | <i>59</i> 0 0 散乱 | 不明48 | | | | | |
| | | THE WATER STREET, STRE | | 子6 数 乱 5.0 t/健テトラポッド、数量不明 52 | | | | | | |
| | | 31 + 0 112 | | | | ッド, 64間(先戦巻) | | | | |
| 時 | S | 53 故 | | 54 K | H 1/3=5.4 2m (| | | | | |
| • | 自然 | | | 56 向 | SW 40 | M 57 ta | ##. 72m/m | | | |
| | | | | ASSAN AN | 不明48 | . N 59 3 | Fift 3 3.0 m/sec 00 | | | |
| 夜 1 | 61 El # | # | 移幼 | した 2 輪は先端 | 24~25日にさらに をニューマチックケー ・ 函分の前面は201/ 62 | ソン、隣りを断面の大 闘 テトラポットで復旧 | きいケーソンに置き | | | |

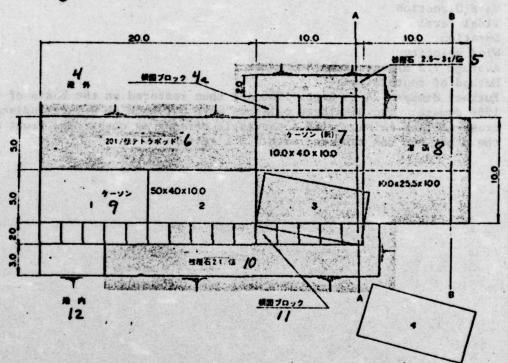
- 1. Regional facility name
- 2. Outer harbor east breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 25 Mar. 1961
- 7. Date damaged
- 8. 17-18 Sept. 1965
- 9. Typhoon No. 24
- 10. Damage status
- 11. Four caissons over a 40.4 m section were damaged, and 2 of them were displaced, one on the cusp was thrown out and overturned. Because of this overlay rock and consolidation blocks on the inner harbor side were dispersed. Wave dissipation works in front of 8.0 t tetrapods of the 5.0 t tetrapod cusp were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.2, compartment wall 0.2, base plate 0.3
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Concrete. Unit volume weight 2.3 t/m3
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Per piece
- 25. Overlay: 2.0 t riprap inside harbor
- 26. Consolidation blocks
- 27. Inside harbor
- 28. Precast concrete armor units
- 28a. 5.0 t tetrapods
- 29. Wave dissipation riprap
- 30. None
- 31. Other
- 32. 8.0 t tetrapods on cusp
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 2 caissons, maximum 15.0 m
- 43. Levee body slope

- 44. 90° (overturned)
- 45. Condition of levee body wave damage
- 46. None
- 47. Dispersion of overlay
- 48. Unknown
- 49. Dispersion of foundation mound
- 50. Dispersion of consolidation blocks
- 51. Dispersion of wave dissipation works
- 52. 5.0 t tetrapods, amount unknown
- 53. Natural conditions
- 54. Wave height
- 55. Actual measurement
- 56. Wave direction
- 57. Tidal level
- 58. Duration
- 59. Wind velocity
- 60. Average 7.2 m/sec; peak 33.0 m/sec
- 61. Method of restoration
- 62. Further damaged 24-25 Sept. 1966 and thus restored on the basis of the 1966 damage. Two displaced caissons were put back on a large adjacent cross section caisson with a pneumatic caisson as cusp. The front of the other two was restored with 2.0 t tetrapods.

被災施設位置問

创 沿津港外港西防流堤参照之

後災負所平面図 3



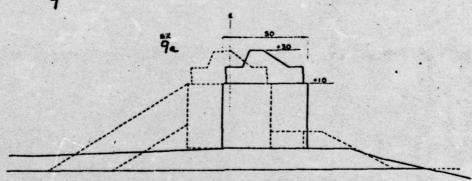
38. Numazu Harbor

FA、日本 子は前後である。4:

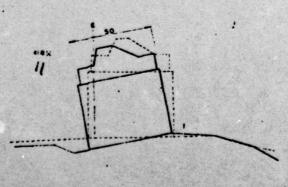
Key:

- 1. Location of damaged facilities
- 2. See Numazu outer harbor west breakwater (37)
- 3. Ground plan of damaged section
- 4. Outer harbor
- 5. Consolidation blocks
- 6. 20 t tetrapods
- 7. Caissons (new)
- 8. Sunken caisson
- 9. Caisson
- 10. 2 t overlay
- 11. Consolidation blocks
- 12. Inner harbor

を対象が対象とより対象を対するとものであります。とはない。とはなるとの問題となった。 との対象が対象とより対象を対象とものであります。 との対象を対象となったという。 被災時断面悶(A-A) 9



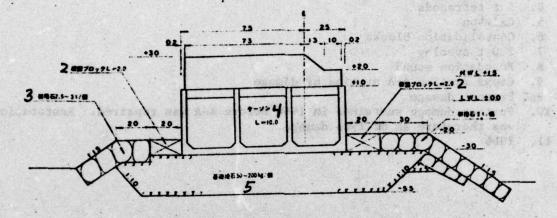
後災時新面徴(A-A)当災復旧前の41年に再び被災し増破した。したがって、41災として復旧した。 10



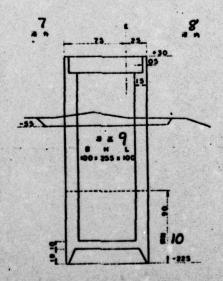
38. Numazu Harbor

- 1. Cross section prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. 5 t tetrapods
- 5. Caisson
- 6. Consolidation blocks
- 7. 2.0 t overlay
- 8. Foundation mound
- 9. Cross section A-A at time of damage
- 9a. Present damage
- 10. Further damage sustained in 1966 before A-A was repaired. Restoration was therefore as of 1966 damage.
- 11. 1966

復旧新面図(A-A)



後担新養體(B-B)



Key:

- Restored cross section A-A
- Consolidation blocks
- 3. Overlay
- Caisson
- Foundation mound
- Restored cross section B-B

概 北島 如

- Outer harbor
- Inner harbor
- Sunken caisson
- 10. (Illegible)

the Back com

通谱等 14 表 户

AND THE COURSE OF THE PROPERTY OF THE PROPERTY

39 字 久 須 港

-

| 地区施設名 | | | - I I | | | | | | |
|-------|--|---|--|------------------------|-----------------------------|-----------|----------|-----------------|--|
| 完成年 | 半月日 | F | | | 7被災年月日 8昭和 4 2 | | | | |
| 被状 | 10 克 | 先继 | のケーソ | ン2低が移動社 | 下し、機外側の被役石。 | . nazyste | | 被覆石が、散乱した。 ・ | |
| | 13 | , 14 , -4, , | | 寸 15 株コンダリート 鉄 19 筋 | B H L 150 部材即不明/6 不明/8 不明/8 | | | | |
| 12 被 | 都 | | | ф 20 M | 不明 | | | 不明 2/ | |
| | | | | ンクリート | a ₂₀ = 160kg/cd | | | | |
| | 23 | 基 礎 格 石 200kg/個内 | | | 外 25 | | | | |
| 災 | | | 1 I | 総外内とも、1 総外内とも、1 | 名石 2.0 t/假 27 | | | | |
| | 5 | San | 38,, | | • | | | | |
| 前 | 都 | 前数32. 万 な L3/ | | | | | | | |
| 10/3 | | <u> </u> | | | | | | | |
| | 33 t | | the state of the s | 1 L J | | | | | |
| | R | 34 新 | 料 | 故 35 高 | H 1/3 = 3.4 m | 被 36 | Æ | 不明24 | |
| —- | | 13 | 4 | 期 37 期 サイカ | | 入38射 | 角 | β = 20° | |
| | 40 | 立部 23 | SHELD BOX OF | 43 # # | 2码, 最大 2.35 m 4 | 12 | | | |
| 38 | 被 | | Control of the Contro | 世紀の状況 | # L31 | | | | |
| 被 | 英 | | | 145 K & | 不明21 | | | | |
| | 100 | | | 五48 数 乱 | 不明24 | | , year | | |
| ¥ | 2. | | | - 47 o 散乱 | 不明 21 | | | San Arrest | |
| • | | | | 148 M M | | | | | |
| | | 33 - | e | NAME OF TAXABLE PARTY. | - | | . 7 | - | |
| 時 | | 49 战 自然条件 战 | | 35 A | 不明2/ | N 37 | 明 | 不明21 | |
| | * CONTRACTOR OF THE PARTY OF TH | | | 50 向 | 不明2/ | m 51 | | 不男24 | |
| • | | | | #3528\$ MI | 不明2/ | R S3 | 蒸 | 不明2/ | |
| 极 | 54 In 35 | 推 | | | 放在および基礎目は有效け、作内側被復石は原 | | TIC 5. (|) t/似中空三角ブ | |

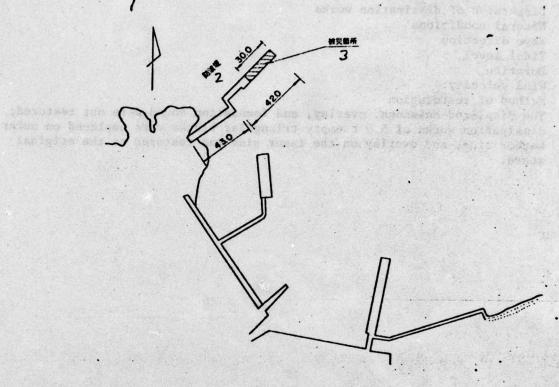
STATE OF

- 1. Regional facility name
- 2. Breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 25 Mar. 1964
- 7. Date damaged
- 8. 27-28 Oct. 1967
- 9. Typhoon No. 34
- 10. Damage status
- Two caissons of the cusp were displaced and settled, and overlay and foundation mound on the outer harbor side and overlay on the inner side were dispersed.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Unit volume weight unknown
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. 200 kg inside and outside harbor
- 26. Overlay
- 27. 2.0 t riprap inside and outside harbor
- 28. Consolidation blocks
- 29. Outside harbor
- 30. Precast concrete armor units
- 31. None
- 32. Wave dissipation riprap
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 2 caissons, maximum 2.35 m
- 43. Levee body slope
- 44. Conddition of levee body damage
- 45. Dispersion of overlay

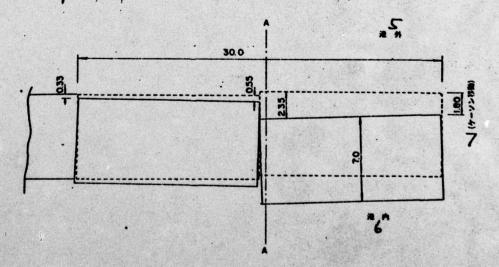
- 46. Dispersion of foundation mound
- 47. Dispersion of consolidation blocks
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Wave direction
- 51. Tidal level
- 52. Duration
- 53. Wind velocity
- 54. Method of restoration
- 55. The displaced caissons, overlay, and foundation mound were not restored; dissipation works of 5.0 t empty triangular blocks were emplaced on outer harbor side, and overlay on the inner side was restored to the original state.

buttom not respect to not every the

被災施設位置例



被災貿所平面図 山



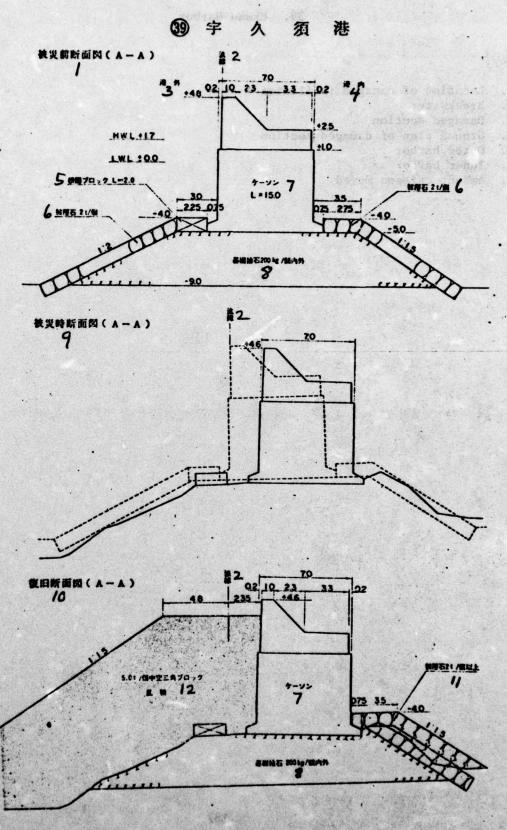
39. Ukusu Harbor

Key:

- 1. Location of damaged facilities
- 2. Breakwater
- 3. Damaged section
- 4. Ground plan of damaged section
- 5. Outer harbor
- 6. Inner harbor
- 7. Amount caisson moved

美工

·伊莱一本 / 经证明结合



Key:

- 1. Cross section A-A prior to damage
- 2. Normal
- 3. Outer harbor
- 4. Inner harbor
- 5. Consolidation blocks
- 6. Overlay
- 7. Caisson
- 8. Foundation mound

· 查查查查

- 9. Cross section A-A at time of damage
- 10. Restored cross section A-A
- 11. Overlay more than 2t/piece
- 12. 5.0t hollow triangular block random rubble

The decimal and a contract of the contract of

游戏的

御田子ノ浦港

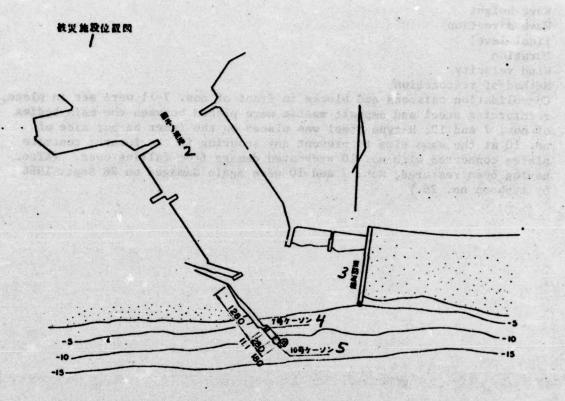
| | | | 2m 0 | | I | <u> </u> | <u> </u> | チックケーソン防彼り | |
|---------|-----------|----------|----------------------|--------------------|---|------------------|----------------|--|--|
| 完成 | 年月日 | - | | 月11日 | 7被災年月日 8個和 | | | 9(台展24号 | |
| 被状 | 10 克 | 卷外 | 放堤には 側地盤が 壊した。 | 11のニューマ 洗掘され、この | ・チックケーソンが設)2輌が倒染寸前の状 !/ | 近してあり、 態で慈外飼に | そのうちの | 07号紙と10号紙の 10号紙の両側の継手 | |
| | 13 | | | 寸 15 株 | 7 5 1 1.0×1 | 3.0 × 1 3.0 | 10%, 1 | D1 8.0 × 2 1.5 | |
| | | | | コンラート | 1:2:4 | 4,00 | | at later | |
| 12 | 立 | | | # 18 B | 7 %, 29.4kg/s | 10 | 5. 6.4kg | A Grand Property of the Control of t | |
| * | 都 | | | + 19 ts | コンクリート | 20 # | 位体资重量 | 2.31/4 | |
| | | 上部 | 場所打 = | アノクリート | 1:3:5 | 19 H 20 H 3 | | well a light | |
| | 22 | * 6 | 看石 | # 124 | | | | | |
| 英 | * | 被 | W I | ts L 24 | | | | | |
| | 6 | 极级 | 36,, | * L 24 | | | | | |
| | | 前数 | 弱,, | # L 24 | | | | | |
| 89 | | m e | 28 ₄ 5 | | | | | | |
| | 29 t | 0 | AL . | tz L 24 | | | | | |
| | | 30. | | 数 31 高 | H 1/3 = 8.0 m | 故 | 32 H | 本 明 33 | |
| | | e1 1 | | 四 34 明 | 1 7 sec | ^ | 35# A | SW 15* | |
| | 37 | 留 提 体 | | 38 + ~ 1 | | | | | |
| | 被 | 立 | | % 横 解 | 7月. 6° 10号. 13° 9号~10号と10号~11号間の継手鉄線 44 | | | | |
| 36 # | 東 | 部 | | 改善 の状況 | | | | | |
| | | 22 拾 石 郵 | 被极 | To K a | - | | | | |
| | 散 | | MESTA | おの 数 和 | | | | | |
| 爽 | | | | 光 ,00枚乱 | | | | | |
| | | | | 450 散乱 | - | | | | |
| | | 29 | * | 0 · 他 | | | | | |
| 14 | 1 4 | 46 被 数 | | 47 × | H 1/3=9.22m | N | 34 1 | 1 4.3 ecc | |
| | | | | 48 向 | 不 9.33 | | 49 6 | +2.0 2 m | |
| | | | | 粉如時間 | 3 h | | 51 2 | 2 2 m/sx | |
| Œ | S2 旧 方 | t | 体と時に | の間に鉄線蛇籠 10号の御内側 | とアスファルトマス に日製銀を打ち込み。 | ティックを人 | れ、再度の ト版で10 | 7号及10号法は本 洗船防止を図ると同 号略と連結し何様を 号のため復旧接再び | |

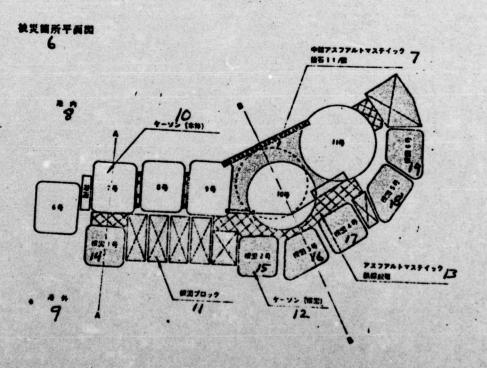
40. Takonouda Harbor

- 1. Regional facility name
- 2. West breakwater
- 3. Construction method
- 4. Pneumatic caisson breakwater
- 5. Date completed
- 6. 11 May 1961
- 7. Date damaged
- 8. 17 Sept. 1965
- 9. Typhoon No. 24
- 10. Damage status
- 11. Eleven pneumatic caissons were in place in this breakwater; the outer harbor side nos. 7 and 10 base was scoured out and these 2 tilted toward the outer harbor; joints on both sides of no. 10 were destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Pneumatic caissons
- 15. Dimensions
- 16. No. 7, No. 10
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Concrete. Unit volume weight 2.3t/m3.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. None
- 25. Overlay
- 26. Consolidation blocks
- 27. Precast concrete armor units
- 28. Wave dissipation riprap
- 29. Other
- 30. Design data
- 31. Wave height
- 32. Wave pressure
- 33. Unknown
- 34. Period
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope (No. 7 and No. 10)
- 40. Condition of levee body damage
- 41. Joints between nos. 9 and 10 and nos. 10 and 11 destroyed
- 42. Dispersion of overlay
- 43. Dispersion of foundation mound
- 44. Dispersion of consolidation blocks
- 45. Dispersion of dissipation works

- 46. Natural conditions
- 47. Wave height
- 48. Wave direction
- 49. Tidal level
- 50. Duration
- 51. Wind velocity
- 52. Method of restoration
- 53. Consolidation caissons and blocks in front of nos. 7-11 were set in place, reinforcing steel and asphalt mastic were placed between the main bodies of nos. 7 and 10; H-type steel was placed on the inner harbor side of no. 10 at the same time to prevent any scouring in the future; concrete plates connected with no. 10 prevented damage from falling over. (After having been restored, nos. 7 and 10 were again damaged on 26 Sept. 1966 by typhoon no. 26.)

⑩田子の浦港





40. Tagonouda Harbor

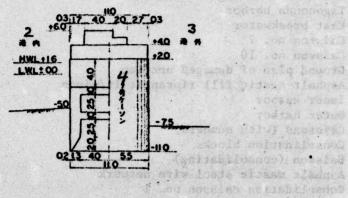
一 以从文章要工工的被钱的发展。

1.95元十分3年 1 對西海南部

- 1. Location of damaged facilities
- Tagonouda harbor
- East breakwater
- Caisson no. 7
- Caisson no. 10
- 6. Ground plan of damaged section
- 7. Asphalt mastic fill riprap at lt/piece
- 8. Inner harbor
- 9. Outer harbor
- 10. Caissons (with numbers)
- 11. Consolidation blocks
- 12. Caisson (consolidating)
- 13. Asphalt mastic steel wire network 14. Consolidation caisson no. 1
- 15. Consolidation caisson no. 2
- 16. Consolidation caisson no. 3
- 17. Consolidation caisson no. 4
- 18. Consolidation caisson no. 5
- 19. Consolidation caisson no. 6

の田子の浦

被災前断面図(7号ケーソン)



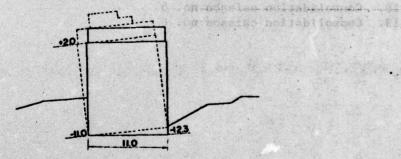
ishul temptaval

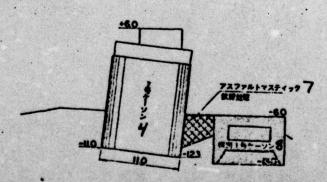
.on agains entrablicant

:41

123

被災時断面関(7号ケーソン) 2





40. Tagonouda Harbor

にマーカラを7 1 的級動類学器

(水水) (原道) 人口能解放工物

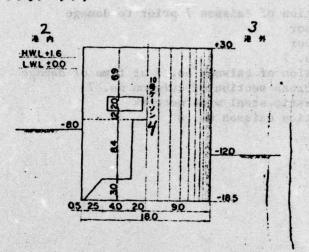
Key:

- 1. Cross section of caisson 7 prior to damage
- 2. Inner harbor
- 3. Outer harbor
- 4. Caisson no. 7
- 5. Cross section of caisson no. 7 at time of damage
- 6. Restored cross section of caisson no. 7
- 7. Asphalt mastic steel wire network
- 8. Consolidation caisson no. 8

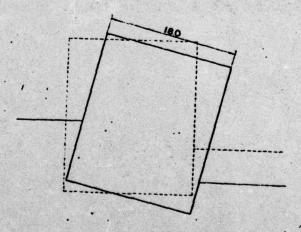
- 100 t ---

40田子の浦港

被災前断面図(10号ケーソン)



被災時断面関(10号ケーソン) C



40. Tagonouda Harbor

Key:

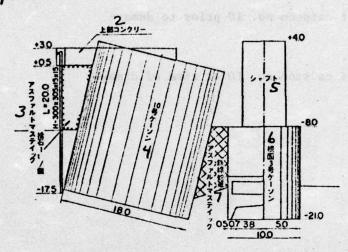
- 1. Cross section of caisson no. 10 prior to damage
- 2. Inner harbor
- 3. Outer harbor
- 4. Caisson no. 10
- 5. Cross section of caisson no. 10 at time of damage

CENTILABITATION

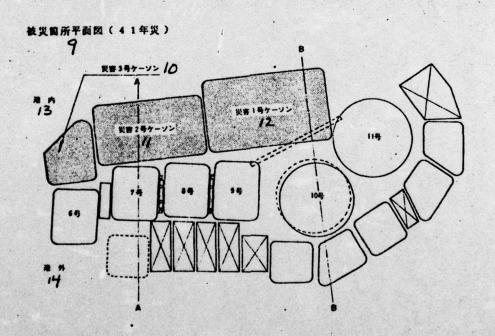
ON SHAPERSON

御田子の浦港

復旧断面図(10号ケーソン)



当災の復旧工事中、41年の台風26号により再び被災したので以下のように復旧した。(自然条件: Hmax10.0m)



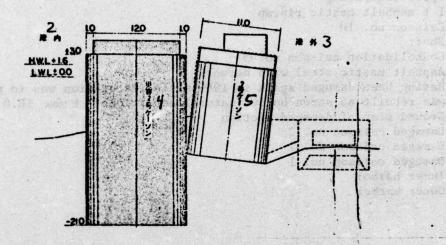
光學主

40. Tagonouda Harbor

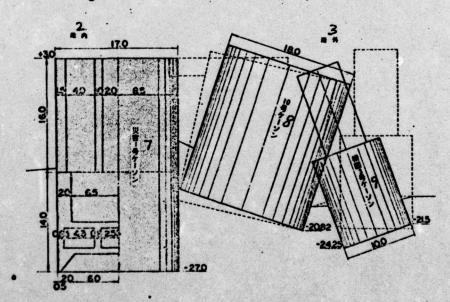
- 1. Restored cross section of caisson no. 10
- 2. Upper concreting
- 3. 1 t asphalt mastic riprap
- 4. Caisson no. 10
- 5. Shaft
- 6. Consolidation caisson no. 3
- 7. Asphalt mastic steel wire network
- 8. Having been damaged again in 1966 while restoration was in progress, it was rebuilt as shown below (natural conditions: H max 10.0 m)
- 9. Ground plan of damaged section
- 10. Damaged caisson no. 3
- 11. Damaged caisson no. 2
- 12. Damaged caisson no. 1
- 13. Inner harbor
- 14. Outer harbor

御田子の浦港

後旧断面関(7号ケーソン:41年災)



復旧新面関(10号ケーソン:41年災)



40. Tagonouda Harbor

N# 41% ES 61

A Black - O Sect of the Bank of the

to be in whee her par it has no

有多数主义对别

BELLE CONTROL OF CONTROL OF CONTROL AND LANGE OF CONTROL OF CONTRO

W 25 1 W H H H H

2. 数据。 经数据

It to be be a new

in a self wa

I HOW BY

HO TERROTTE

Key:

- 1. Restored cross section of caisson no. 7 (1966 damage)
- 2. Inner harbor
- 3. Outer harbor
- 4. Damaged caisson no. 2
- 5. Caisson no. 7
- 6. Restored cross section of caisson no. 10 (1966 damage)

is aller environdance heromatives of

- 7. Damaged caisson no. 1
- 8. Caisson no. 10
- 9. Consolidation caisson no. 3

YE FIR BEEN

和東丁十二四 人工 聯

① 英名港

| 完成年 | 并月日 | 6 8770 | 3 4年3 | 月25日 | 7被炎年月日 8時和 4 | 7.年9月16~17 | 8 | 9(台版20号) |
|----------|-----------------|------------------------|-------|--|--|-------------------------------|-----|---|
| 被状 | 10 克 | 固テ | トラボッ | | る場所で出棚時の就送 を外が軟勢になったとう ・折損した。 // | | | |
| /2 # | 立部 | 76 | 14 , | 寸 15 株 コンパート 株 18 版 中 19 株 | 不明16 | to so enters | | |
| 英 | 22- 拾 石 部 | 基 做 被 极固: 稍被: | | 不明化 な L25 | 1:3:6(コンタリートバイルの上部工)2/ /個テトラボッド 27 | | | |
| | 30七 0 他 32 股計資料 | | | プロック前後 被 33 高 間 35 期 | 不明化 | = 8.0 mのコンクリー 被 34 入34射 | 圧角 | ~ 3/ 不 明化 不 明化 |
| 37 被 | 38 X X X | 22. 拾石部 | 提体被機能 | 3 ナベリ 90 傾 料 取例の状況 10 軟 乱 47 0 軟 乱 45,0 散 乱 48 0 軟 乱 | コンタリートバイル ー 不 明化 延長, 63.8m. 1 | | | |
| * | | 30 9 34 | 故 | 50 Mg | H 1/3=5.6m SSE 70h | m 35 m 5/ m 53 | 期位建 | 不 明 龙 +1.8 m 平均 16.3 m/ser Si 段数 3 1.5 m/ser Si |
| W | 55 旧 方 | 推 | *极 | 間工として5.0 | トパイルを除去し、フ リグ朝テトラボッドで 日型銀を打込んだ。 | | | た。また、港内側 |

201

41. Hamana Harbor

- 1. Regional facility name
- 2. Training levee (east)
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 25 Mar. 1959
- 7. Date damaged
- 8. 16-17 Sept. 1972
- 9. Typhoon No. 20
- 10. Damage status
- 11. The normal basin on the inner harbor side was washed out by rapid currents from a receding tide where the waves were concentrated; consolidation blocks were dispersed, and blocks fell toward the inner side because of wave pressure at places where the levee body was weakened; concrete piles on inner harbor side were also damaged.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. F111
- 20. Upper concreting in site
- 21. (Superstructure on concrete piles)
- 22. Riprap part
- 23. Foundation mound
- 24. Overlay
- 25. None
- 26. Consolidation blocks
- 27. 2.5t tetrapods inside harbor
- 28. Precast concrete armor units
- 29. Wave dissipation riprap
- 30. Other
- 31. $\phi = 0.35$ m around blocks; $\underline{1} = 8.0$ m for concrete piles
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. Breaking of concrete piles
- 43. Dispersion of overlay
- 44. Dispersion of foundation mound
- 45. Dispersion of consolidation blocks

- 46. Unknown
- 47. 110 blocks extended 63.8 m
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Wave direction
- 51. Tidal level
- 52. Duration
- 53. Wind velocity
- 54. Average 16.3 m/sec; peak 31.5 m/sec
- 55. Method of restoration

数 不吸到于能

56. Cross section of the blocks was enlarged except for broken concrete piles.
5.0t tetrapods were restored on the inner harbor side as consolidation works; H-type steel was added to the front 15.0 m of the levee body to prevent scattering of the tetrapods.

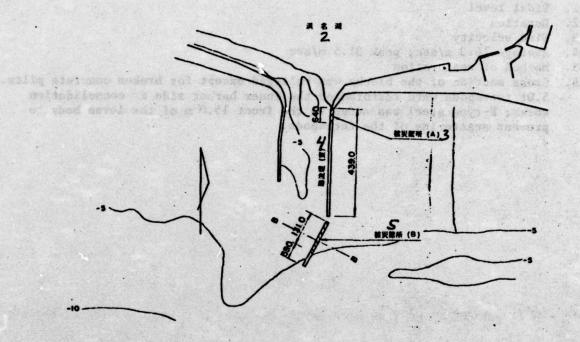
-- \$21

2 8 4 - 4

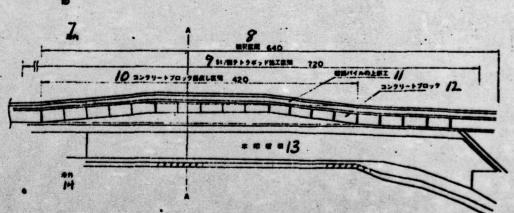
edrow collectedb to note regard

Enderthood Taxable

被災施股位置因



後災策所平面図



41. Hamana Harbor

Key:

- 1. Location of damaged facilities
- 2. Lake Hamana
- 3. Damaged section A
- 4. East training levee
- 5. Damaged section B
- 6. Ground plan of damaged sections
- 7. Inner harbor
- 8. Damaged sector
- 9. 5t tetrapods work sector
- 10. Sector where concrete blocks were replaced

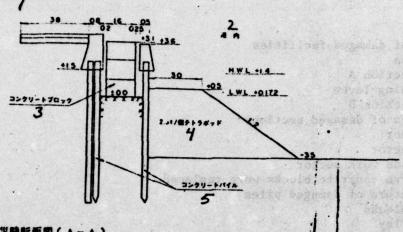
超速超速

II mais

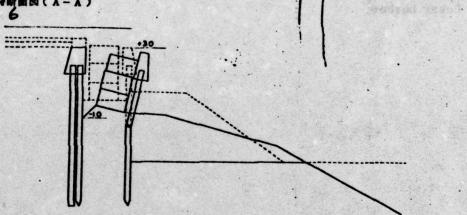
- 11. Superstructure of damaged piles
- 12. Concrete blocks
- 13. Apron overlay
- 14. Outer harbor

全国一大学经济现代为

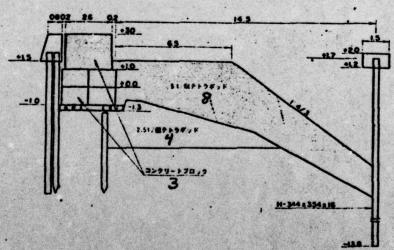
被災前断前間(A-A)



後災時新面図(A-A)



復旧新顧問(A



41. Hamana Harbor

(注) 京京 阿蒙 客 整 题 还 加上

Key: Cross section A-A prior to damage 1. 2. Inner harbor Concrete blocks 2.5t tetrapods 4. 5. Concrete piles 6. Cross section A-A at time of damage Restored cross section A-A 5t tetrapods 21 90 99 15 2 95 19 8 9 the state of the s 在1820年前1930年出 一次10% 旅 S & S & S & S & S & S AP 防留于安全一场加速强烈 近对古中一世 中国 THE MADE PROPERTY OF PARTY Was an early at the last () 建 () M 35 M E.E. 2.9 10 33 海鲁主子 . . . 有品质等 See al 图 成 题 炸

| /地 | 区施 | 股名 | 24 歲 | 拠 (東) | | B桥遊棋式 4拾石 | 沃夫 | 頁斜堤 |
|------------|-----------|--------------|----------------|----------|--|-----------------|----------|-------------------------------------|
| 完成 | 年月日 | 6昭 | 的47年3 | 3月25日 | 7被災年月日 8昭和 4 | 7年9月16日 | | 9(台展20号) |
| 被状 | の表 | | | | 延長において,港外内の 傾斜又は転落した。 |)前被デトラポット // | . pi M | 混し、拾石上部のコ |
| | 13 | | | 寸 15 株 | B H L 1.75×1.3×3.5 | | | lin wikting |
| | | 1 | 14 | コンタリート | 620 - 1 6 0 kg/cml | Add noither | (8) | ione beam ass |
| 12 | 立 | | | 表 17 伤 | | | | |
| 被 | 部 | | 4 = 1 | 中 18 档 | | 8 3 4 7 7 9 8 9 | | |
| | | | | レクリート | # L20 | | | |
| | 김 | | 7% 石 | 500kg/個 | 23 | | | |
| 英 | 捨 | Balance. | # I | 絶外内とも | 拾石1.01/個25 | | | |
| | 5 | The state of | 36., | # L20 | | | | |
| | | | 和,, | 卷外, 16.0 | t/個テトラボッド 2 | 9 港内。12.5 t, | /個: | テトラポッド |
| 89 | | M à | 7% 五 | # L20 | | | | |
| | 30 t | 0 | Nt. | * 150 | | | | |
| | | 31 | E #4 | 被 32 高 | H 1/3=4.5 m | 被 33 | Æ | 孙 故 34 |
| | | | | 用 35 期 | | 入36射 | Ħ | β=15° |
| | 38 | 13 | | 39+ ~ 1 | | 4 | | |
| | * | 立 | | 48 横 斜 | THE RESERVE AND ADDRESS OF THE PARTY OF THE PARTY. | | • | |
| 37 | 2 | | | 140 状况 | | 転落 42 | | |
| | | 21 | | 130 M & | | | | |
| | | 5 | | 石 数 数 | t 120 | | | |
| * | | | 根因プ | 45,0散乱 | - | | | |
| | | 1 | 前被 | 工物教品 | 延長 1 3 1.0 m 差外 | | 4 | 7 |
| | | 30 | t , | 0 16 | 拾石の此下200㎡ | '' | | |
| N) | 4 | 8 | 被 | 32 * | H 1/3=5.6 m | M 35 | 期 | 本明50 |
| | 自然 | 条件 | 故 | 51 m | SSE | . # 52 | 位 | +1.8m |
| | • | | 12 | m53m m | 70h | R 34 | 慈 | 平均 16.3 m/sec 55 時段 315 m/sec 55 |
| a 1 | 56 旧 方 | 胠 | 10 TE | 7 7 | | | | |

42. Hamana Harbor

- 1. Regional facility name
- 2. Training levee (east)
- 3. Construction method
- 4. Riprap sloping levee
- 5. Date completed
- 6. 25 Mar. 1972
- 7. Date damaged
- 8. 16 Sept. 1972
- 9. Typhoon No. 20
- 10. Damage status
- 11. Wave dissipation tetrapods on inner harbor side were scattered on the whole 131.0 m extension that was damaged; concrete blocks of the upper riprap shifted and either tilted or overturned.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. None
- 21. Riprap part
- 22. Foundation mound
- 23. 500 kg/piece
- 24. Overlay
- 25. 1.0t riprap inside and outside harbor
- 26. Consolidation blocks
- 27. Precast concrete armor units
- 28. 16.0t tetrapods outside harbor; 12.5t tetrapods inside
- 29. Wave dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Breakers
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. 3 upset on both crowns
- 43. Dispersion of overlay
- 44. Dispersion of foundation mound
- 45. Dispersion of consolidation blocks

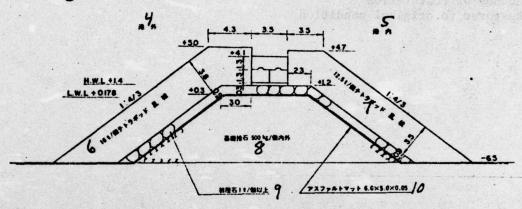
- 46. Dispersion of dissipation works
- 506 blocks, including those inside and outside harbor, extended 131.0 m Natural conditions 200 m³ of riprap settled 47.
- 48.
- 49.
- 50. Unknown
- 51. Wave direction
- 52. Tidal level
- 53. Duration
- 54. Wind velocity
- 55. Average 16.3 m/sec; peak 31.5 m/sec
 56. Method of restoration
 57. Restored to original condition

(第一年) 展出的数据

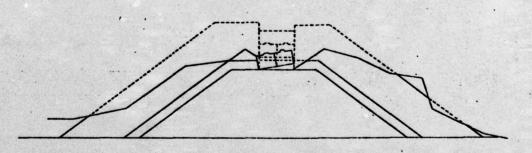
被災施設位置図

2 ① 英名港導流堤(東) 参照(被災箇所B)

被災前断面図(B-B) 3



被災時断面閃(B-B)



42. Hamana Harbor

Market attended by the a

BOLDENNIA VE M

A 等 B B B B A

25

以外限期的 多 雅 起 起 点气

Key:

- 1. Location of damaged facilities
- 2. Hamana harbor training level (see 41) (damaged section B)
- 3. Cross section B-B prior to damage
- 4. Outer harbor
- 5. Inner harbor
- 6. 16t tetrapod random rubble
- 7. 12.5t tetrapod random rubble
- 8. Foundation mound
- 9. Overlay more than lt/piece
- 10. Asphalt mat
- 11. Cross section B-B at time of damage

25 经原料实验证的主义工作的证金

A THE SECOND SEC

A CANADA CALLANDA CAL

43 四日市港

| - | | | 2旭即 | | | 様式 4ケーツ | |
|-----|-------------|-----------|-------|--------------------|---|---------------------------------------|------------------------------------|
| 完成年 | 月日 | 6昭和 | 38年3 | 月 | 被災年月日 8四和 47年 | 9月16日 | 9(台風20号) |
| 被状状 | の表 | た。 | ソンが移 | 動しその衝撃と抗 | 最動により上部パラペット B // | 目地部14ヶ所に | 弦線又は象製を生じ |
| | /3 m | | | 寸 15 推 | 0.0 1.0 1.0 1.0 | 0.4 陽壁 0.2 底 | 1.0 16 |
| | 立 | 1 | 4,2 | =>10-F | 不明/8 | weether and | |
| 12 | | | | 改 19 坊 | 木 明 <i>18</i> | W. H. M. 49 45 45 | Production Sept. |
| 被 | 都 | | 2 | 中 20 結 | ₩ 2/ | 単位体積重量 | 不明 |
| | | | 場所打二 | 50~500kg | 不明/8 | | |
| 英 | 23 措 | | 1 1 1 | | 含石300~500kg/個·2 | | |
| * | 石 | - | 37,, | 他外, 1.5×1 | | | |
| | | | 29.0 | ts L 30 | .0 × 2.0 | | |
| 的 | 都 | | 捨石 | ts 130 | | | |
| | 37.2 | 0 1 | | t 130 | | | |
| | - | | | 故 34 高 | H 1/3 = 4.0 m | 故 35 E | 孙.被36 |
| | R | 33 H # | i #i | 周 37 期 | 7. 4 sec | 入38射 舟 | β = 28° |
| | | 13 | 提体 | 4/ナベリ | 26函. 极大0.7m 42 | | |
| | 40 数 | 立 | 提体 | 430 桶 料 | ts L30 | | |
| 39 | 炎 | 部 | 提休 | 数据 的状况 | 上部パラペットの破壊又に | 10裂45 | |
| | * | 23 | 被极 | 460 数 数 | te 130 · | | |
| | 数 | 拾石 | 基础 | 指70 数 乱 | te 130 | | |
| 英 | a · | 部 | | 48,00散乱 | ts 130 - | | |
| | | | 角被 | 10 数 乱 | - | | |
| | | 32 | t | の 他 | - 57 | · · · · · · · · · · · · · · · · · · · | |
| 時 | | 20 | 故 | 34 % | H 1/3=3.5 m (推計) | 周 37 期 | 7. 0 sec |
| | 自然 | る件 | 被 | 52 向 | SE | 期 53 位 | |
| | | | 杜 | #54m 10 | 不明/8 | 虽 55 法 | 最大 SE 33.5m/sec 時最 SF 44.0m/sec |
| W | 57 11 75 | th. | 参野 | に根例プロック 面の決定に当り | 防放裝機能上問題がないの。 を 2 段積とした。また、バ 、当初設計条件を用い次の収 対策、(2)期待裕量量への対策 | ラベット目地は原i 食計を加えた。(1) | 形似旧とした。とれ |

43. Yokkaichi Harbor

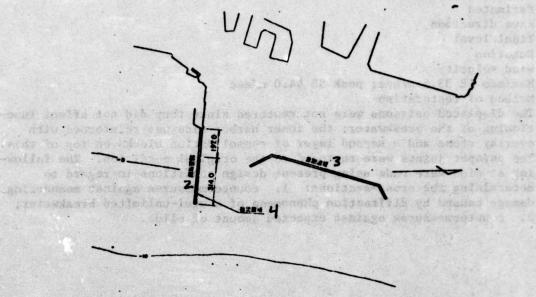
- 1. Regional facility name
- 2. Asahi breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Mar. 1963
- 7. Date damaged
- 8. 16 Sept. 1972
- 9. Typhoon No. 20
- 10. Damage status
- 11. Caissons were displaced and shock and vibration from this destroyed the upper parapet joints in 14 places or caused cracking.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.4, compartment wall 0.2, base plate 1.0
- 17. Concrete
- 18. Unknown
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. Overlay
- 26. 300-500 kg riprap inside and outside harbor
- 27. Consolidation blocks
- 28. Outside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Wave dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. 26 caissons, maximum 0.7 m
- 43. Levee body slope
- 44. Condition of levee body damage
- 45. Destruction or cracking of upper parapet

- 46. Dispersion of overlay
- 47. Dispersion of foundation mound
- 48. Dispersion of consolidation blocks
- 49. Dispersion of dissipation works
- 50. Natural conditions
- 51. Estimated
- 52. Wave direction
- 53. Tidal level
- 54. Duration
- 55. Wind velocity
- 56. Maximum SE 33.5 m/sec; peak SE 44.0 m/sec
- 57. Method of restoration
- 58. The displaced caissons were not restored since they did not affect functioning of the breakwater; the inner harbor side was reinforced with overlay stone and a second layer of consolidation blocks on top of this. The parapet joints were restored to the original condition. The following studies were made using present design conditions in regard to determining the cross-sections: 1. countermeasures against meandering damage caused by diffraction phenomena of a semi-unlimited breakwater; 2. countermeasures against expected amount of slide.

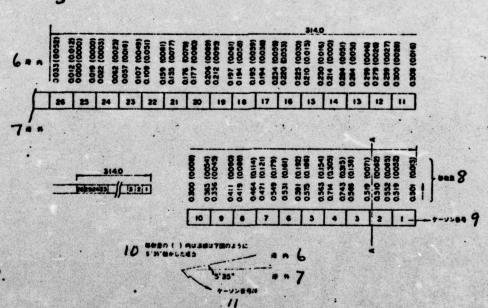
ARMI SURME

adout notabeleshor to college

被災施設位置的



後災資所平面因

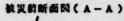


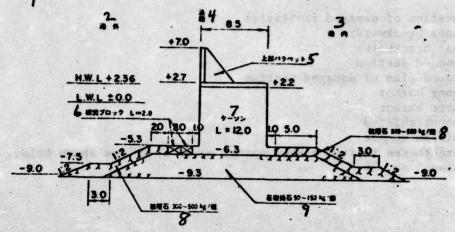
43. Yokkaichi Harbor

であっても制造が技術等で

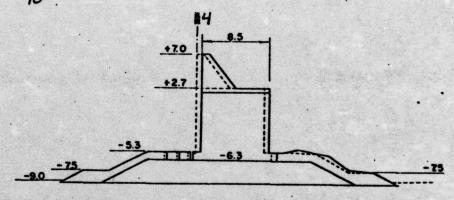
《大学》的研究的是

- 1. Location of damaged facilities
- 2. Asahi breakwater
- 3. East breakwater
- 4. Damaged section
- 5. Ground plan of damaged section
- 6. Inner harbor
- 7. Outer harbor
- 8. Amount shifted
- 9. Caisson number
- 10. Parentheses in item 8 show normal moved 5' 35" as shown below.
- 11. Caisson no. 26

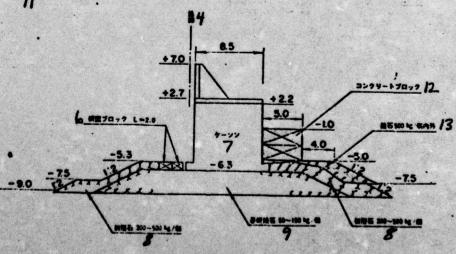




後災時断面関(A-A) 10



復旧新面図(A-A)



43. Yokkaichi Harbor

TERRES MESOCOSOS ASAME!

Key: with the second control of the second c

- Cross section prior to damage
- Outer harbor
- Inner harbor 3.
- Normal
- Upper parapet
- Consolidation blocks
- Caisson 7.
- 300-500 kg overlay
- 50-150 kg foundation mound
- Cross section at time of damage 10.

En mier affect an ein ber beier gener bei PARSE MEANING MA VAC MUNICIPALITY

- 11. Restored cross section
- 12. Concrete blocks
- 13. 500 kg riprap

| 地 | 区 推 | 段 名 | 2两 | 方枝类 | A harranter 3m2 | 株式 4場所打つ | ンクリート式提成が | t |
|-----|------------|----------|----------|------------------|--|------------|--------------------------|--------|
| 完成年 | 年月日 | 6昭和 | 38年3 | 月25日 | 7被炎年月日 8四和 4.5年 | 7月5~6日 | 9(台級2号 |) |
| 被人状 | 10 克 | | | が改浪により 数箇所ひび割 | はく離され、港内側被模石も れが入った。 // | | た。 また、 本体お | |
| | 13 | | 4 | 7 15 8 | | | 665 C | |
| | 立 | 場所 | 打コン | | | edsocial s | AT 18 TO THE CAN | |
| 12 | | 1." | - | # 17 # p 18 t | | | 111073 63 | |
| 被 | - | - | 19 | 1299-F | セメント使用量 2 2 0 kg/ | W 70 | | |
| | 21 | - 6 | 34 5 | 5 Okg/個件 | | • W | | 3 |
| 爽 | * | 20 | I | | 拾石200~500kg/個 2 | 5 | | |
| | 4 | 根因 | | te L27 | | | | |
| | | 荷技 | | t L 27 | | | | |
| M | # | | 9 | t L 27 | | | | |
| | 30t | 0 (| d | t L 27 | | | | |
| | | 3/ | | 表 32. 7 | H 1/3 = 2.1 m | ₩ 33 E | 不明34 | |
| | R | at M | * | m 35 s | A 6 asc | . A36# A | 不 男 34 | |
| | 20 | 日日 | 提件 | 39+ ~ | 27 to 127 | | 3. 11 11 12 12 12 | |
| | 38 | 立 | 操体 | 46 4 1 | | | | |
| 37 | 类 | 3 | 提体 | 被 | 2 4 6 27 | | | |
| | | 出始 | 被概 | I'S N | | | | |
| | * | 石 | * * | | 港外, 延長161.1m, 1 | 78㎡ 港内、延長 | 1388m, 162m | 45 |
| 爽 | - | # | 機関ブ | W ON | | | | |
| | | - | 州被 | | <u>1 - · </u> | · | | |
| | | 30 | | 0 16 | H 1/3=4.0 m (BM) | 1 | 6.0 sec | |
| H | | 18 | 被 | 32 * | | m 35 m | | |
| | 自然 | 条件 | * | 50 向 852時 10 | ESE 10h | M 5/ W | | /sec . |
| | | | 48 | | | | | |
| a | 65 IB 3 | 桂 | | | 技能石を復旧してその上に巻/ 三角プロックには前数工を数/ 56 | | 二月フロック、糖 | n |

44. Shiroko Harbor

- 1. Regional facility name
- 2. South breakwater
- 3. Construction method
- 4. Site placed concrete composite breakwater
- 5. Date completed
- 6. 25 Mar. 1963
- 7. Date damaged
- 8. 5-6 July 1970
- 9. Typhoon No. 2
- 10. Damage status
- Overlay stone on outer harbor side was torn away by waves and that on inner side scattered by overpassing waves. The main body and superstructure also were cracked in many places.
- 12. Prior to damage
- 13. Vertical part
- 14. Site place concrete
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. F111
- 19. Upper concreting in site
- 20. Cement used 220 kg/m3
- 21. Riprap part
- 22. Foundation mound
- 23. About 50 kg/piece
- 24. Overlay
- 25. 200-500 kg riprap inside and outside harbor
- 26. Consolidation blocks
- 27. None
- 28. Precast concrete armor units
- 29. Wave dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Unknown
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. Dispersion of overlay
- 43. 161.1 m extension of 651 m³ outside harbor; 138.8 m extension of 461 m³ inside harbor
- 44. Dispersion of foundation mound

- 45. 161.1 m extension of 178 m³ outside harbor; 138.8 m extension of 162 m³ inside harbor
- 46. Dispersion of consolidation blocks
- 47. Dispersion of dissipation works
- 48. Natural conditions
- 49. Visual measurement
- 50. Wave direction
- 51. Tidal level 52. Duration
- 53. Wind velocity
- 54. Maximum E 18.5 m/sec; peak E 27.8 m/sec
- 55. Method of restoration
- 56. Damaged overlay on both sides of breakwater restored and a dissipation works of 3 t hollow triangular blocks (outer side) and 2 t hollow triangular blocks (inner side) emplaced over this.

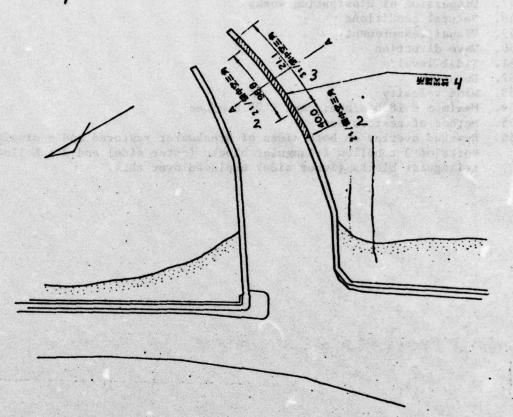
表 · 表 在 63-12/78/10 图 64

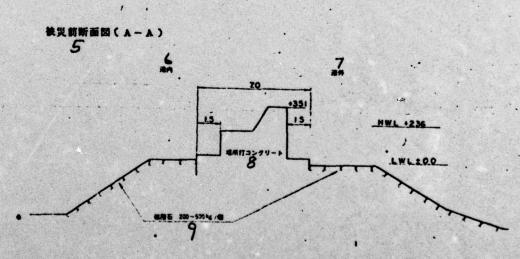
- 101 --

the state of shirt and the

what ediablicars is writinged,

被災施設位置网





44. Shiroko Harbor

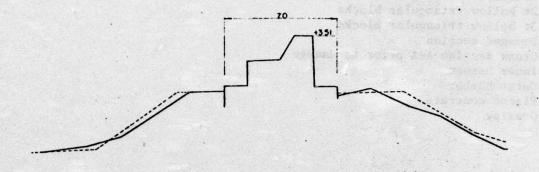
(4 - 4) 精起 是连续

Key:

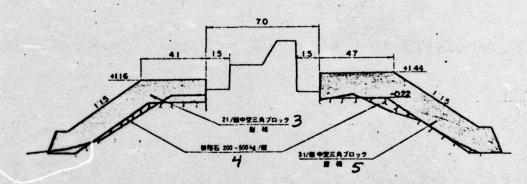
- 1. Location of damaged facilities
- 2. 2t hollow triangular blocks
- 3. 3t hollow triangular blocks
- 4. Damaged section
- 5. Cross section A-A prior to damage
- 6. Inner harbor
- 7. Outer harbor
- 8. Placed concrete
- 9. Overlay

···尼斯斯·····

被災時断面図(A-A)



復旧断面図(A-A)



44. Shiroko Harbor

Key:

- 1. Cross section A-A at time of damage
- 2. Restored cross section A-A
- 3. 2t hollow triangular blocks
- 4. Overlay
- 5. 3t hollow triangular block random rubble

The property of the second of

To manife the large and the party of the large and the lar

THE TEE OF LEASE BY LEASE

The state of the

· (5) 2 13 29

AV PRED LARRENCE TO A COLOR OF

2004

温 张 海 率

| 地 | 区施 | 段名 | 211 13 | 地区東防波 | | I | 球式 4プロ | | 式起成堤 |
|-----|------------|-----------|----------------|-------------|-------------|------------|-------------|--------|--------------------------------|
| 完成年 | 手月日 | 6昭和 | 41年3 | 月25日 | 7被災年月日 | 8昭和 4 4年 2 | 月5~6日 | | 9(低氢压 |
| 被火 | の気 | KI | り本体プ | | | | じ20 個程 | 転落 (| が沈下散乱し,彼 殺 した。また,上部エ |
| | 温面 | | | 寸 15 th | | * 16 | Track Light | S.4:18 | र अवस्ति । व |
| | | 71 | 4, | コングート | 1:3:6 | | | | |
| 12 | 立 | | | # 18 B | 5 - | | | 1 | |
| 被 | 部 | | | # 19 to | | | | | |
| | | 上部 | 場所打 | アクリート | 1:3:6 | | | | |
| | 21 | 基礎 | 12 石 | 300~50 | 0kg/個23 | | | T | |
| 炎 | 拾 | 被 | # I | 港外内とも | 4.0 1/個テ | トラポッド 25 | | 1 | |
| | 石 | 根固 | 36,, | te L 27 | | | | 1 | |
| | 都 | 消波 | 38., | ts L 27 | | | | | |
| 前 | - | 俏被 | 29 石 | ts 127 | ta . | | | | |
| | 30t | Ø A | Ł | 1 L 27 | | | | | |
| | | 3/ H H | | 故 32 元 | 6 H 1/3=6 | .0 m | 被 33 | Æ | 砕 被 34 |
| | 設 | at M | # } | 周 35 其 | 月 1 1.0 sec | | 入36射 | 角 | β = 6 0° |
| | 2 | 13 | 堤体 | 34 ~ ! | ts L 27 | | | | |
| | 38 | 立 | 堤体 | 粉梅车 | t L 27 | | | | |
| 37 | 炎 | 部 | 堤体 | 数据 0 状态 | マ 本体プロッ | 夕約20個吸出 | し伝答。上 | 部工 | 作电裂 42 |
| | ^ | 21 | 被极 | 430 K 8 | 後外内とも | , 延長65.2m | 教量不明 | 44 | |
| | 数 | 拾 | 基礎 | £150 tk . € | 港外,被災 | あり、数量不明 | 146 | | |
| 災 | | 石部 | 根間ブ | 4700 m | ı - | | | | |
| | | ap . | 稍被 | 180 K 8 | t - | | | | |
| | | 30 | Annual Service | · ② 他 | - | | - | , | |
| 時 | | | 被 | 32. A | Hmax = 7. | 6m(突翻) | 周 35 | 期 | 1 1.0 sec |
| | 自然 | 条件 | 故 | 51 m | NW | | 期 52 | 做 | 不明53 |
| | 1 | | k! | 粉料時 間 | 不 明 53 | | M 55 | 差 | 2 1.1 m/sec |
| a | 56 旧方 | 技 | 内安 | 全のため不適当 | | | | | それよび施工中の港 で他は80t/伽テ |

45. Tottori Harbor

- 1. Regional facility name
- 2. Karo section east breakwater
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 25 Mar. 1966
- 7. Date damaged
- 8. 5-6 Feb. 1969
- 9. Low pressure
- 10. Damage status
- 11. The whole length of the damaged section, 65.2 m, was overreached and the foundation basin washed out. Overlay tetrapod subsided and was scattered and main levee blocks were sucked out by the waves; slackness developed completely and 20 blocks fell down. Cracks developed in 2 places in the superstructure.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. See appended chart
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. 4.0 t tetrapods inside and outside harbor
- 26. Consolidation blocks
- 27. None
- 28. Precast concrete armor units
- 29. Wave dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Breakers
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. About 20 main blocks sucked out and fell; cracks in superstructure
- 43. Dispersion of overlay

- 44. 65.2 m extension inside and outside harbor, amount unknown
- 45. Dispersion of foundation mound
- 46. Damage outside harbor, amount unknown
- 47. Dispersion of consolidation blocks
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Actual measurement
- 51. Wave direction
- 52. Tidal level
 53. Unknown
- 54. Duration
- 55. Wind velocity

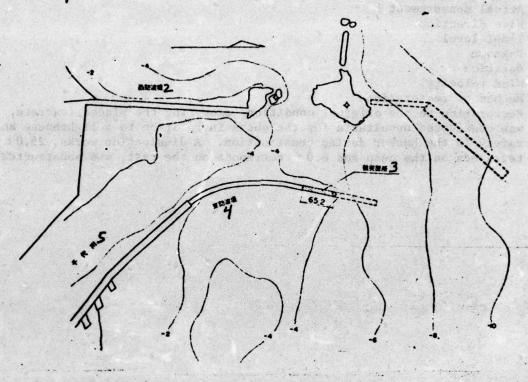
10、45 单元生物的扩充

- 56. Method of restoration
- 57. Restoration to the original condition, excepting the placed concrete, was considered unsuitable for the costs in relation to a lighthouse and safety in the harbor during construction. A dissipation works, 25.0 t tetrapods on the cusp and 8.0 t tetrapods on the rest, was constructed.

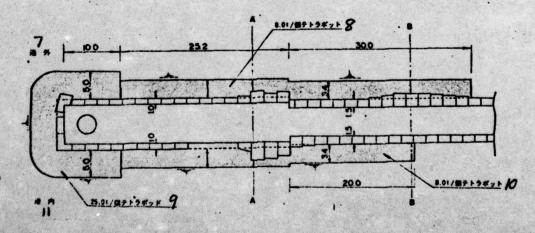
manatus sinceres, madres con a Alegana I

where beilpeleckbeile hermägell

被災施設位置図



被災資所平面図 6



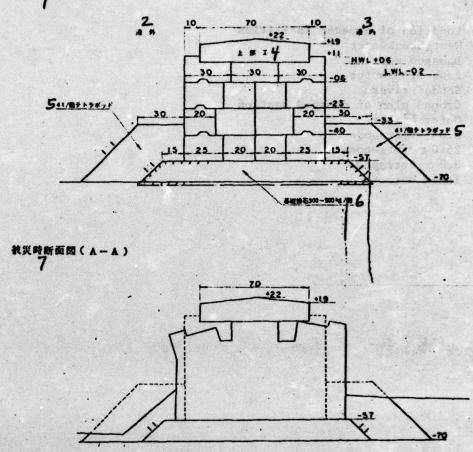
45. Tottori Harbor

《本一五》即語遊算原於

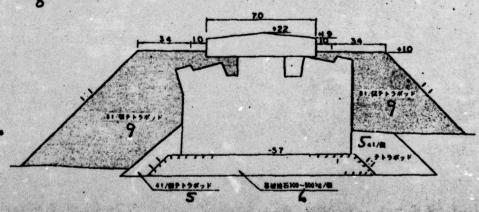
4.七一人) 动医物作物

- 1. Location of damaged facilities
- 2. West breakwater
- 3. Damaged section
- 4. East breakwater
- 5. Sendai river
- 6. Ground plan of damaged section
- 7. Outer harbor
- 8. 8.0 t tetrapods
- 9. 25.0 t tetrapods
- 10. 8.0 t tetrapods
- 11. Inner harbor

被災前断面悶(A-A)



復旧新面図(A-A) 8



45. Tottori Harbor

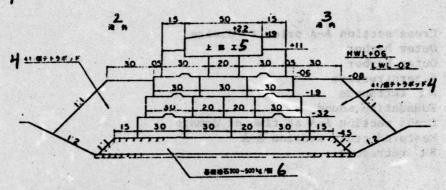
Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Outer harbor
- 4. Superstructure
- 5. 4t tetrapods
- 6. Foundation mound
- 7. Cross section A-A at time of damage
- 8. Restored cross section A-A
- 9. 8t tetrapods

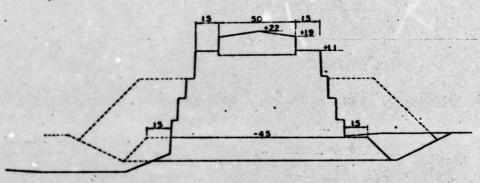
A to the remember .

· 在一位 / 列展 2018 向

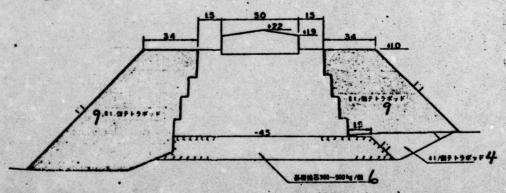
被災前断而図(B-B)



核災時所面間(B-B) フ



推旧新面間(B-B)



45. Tottori Harbor

otu si

and the tab

Afm sea tro

at which to be all the stand

Maraban of the are

Key:

- 1. Cross section B-B prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. 4t tetrapods
- 5. Superstructure
- 6. Foundation mound
- 7. Cross section B-B at time of damage
- 8. Restored cross section B-B

gen a to we a

对数分子 1 20 002 · 15

Sy have make the track to the make the less of the

and at 1 数 数 数 m later and the south

THE MELL ASSESSMENT AND PROPERTY OF THE RESIDENCE OF

ad a lattle of the first of the common of the contract of the

9. 8t tetrapods

135

《海域》,以中心,这种心态,这种心态,但是是一种的。

| W M M M M M M M M M M M M M M M M M M | A B H L A 2.4×1.5×2.4 1:3:6 | お石が散乱し本体プロ | *2.4 *** *2.4 *** *3.3 ** *2.4 ** *3.3 ** * |
|---|---|---|--|
| サック コンクルート 鉄 17 新中 18 結 中 18 結 所打コンクリート 活石 50~200kg エ 港外内とも、 2,ク な し 20 な し 20 な し 20 数 石 な し 20 数 石 な し 20 | A 24×1.5×2.4 1:3:6 - | 5 1.8 × 1.5 | ×2.4 |
| 中 18 結 所打コンクリート 着石 50~200kg 工 港外内とも、 信,ク な し20 流石 な し20 放石 な し20 数 3/ 高 | /個23 2.0 t/個25 不明32 | ₩ 34 E | 3943893 8 |
| エ 港外内とも、 を , ク な し 20 を 石 な し 20 な し 20 数 る と 20 | 2.0 t/個25 不明32 | # 34 E | |
| 2,9 なし20 新石なし20 なし20 数3/ 高 | | # 34 E | |
| 北 L 20 数 3/ 高 | | # 34 E | |
| IM JJ M | 不明32 | A35# A | 不明32 |
| 提供 38寸 ベ り 提供 38 種 斜 提供 数据 0 状况 | 0.2~0.3m 10~20° なし20 | | |
| 被模式。收息 基模者。收息 根例:4500收息 构始另一数 8 | - | | 5.0m, 780m 42 5.0m, 1,120m 44 |
| · • • | | m 33 m | 1 1.0 sec |
| 故 49 向 粒 級/時 間 | ENE | 用 50 位 | +0.4 m 平均EME 15.7m/sec 時級EME 30.5m/sec |
| | 根間プログラクの散乱 前 被 望 の 散 乱 の 他 被 3/ 高 故 49 向 粒 続5/時 間 化下移動した本体プ | 機関プログラクの散乱 一 前 被 望 の 散 乱 一 の 他 一 被 3/ 高 Hmax=3.0m(目標) 故 49 向 ENE 軽 続5/時 間 1.0h 北下移動した本体プロックは復旧せず、港外内 港外内の被災した被覆石、基礎橋石は原形復旧 | 機関プログラクの散乱 前 被 至 の 散 乱 |

200

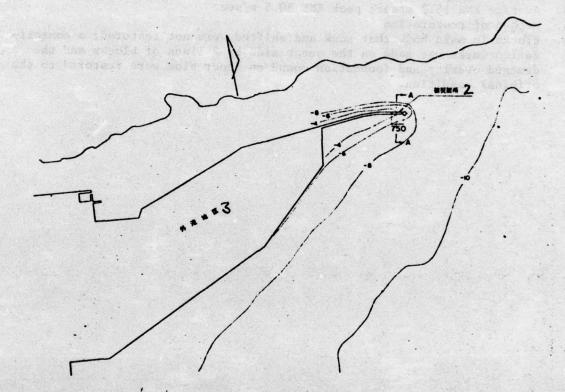
46. Sakai Harbor

- 1. Regional facility name
- 2. Outer harbor section breakwater
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 1930
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. 75.0 m of the damaged section was overreached and the overlay and foundation mound scattered; main blocks subsided. These blocks also shifted at many places.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. None
- 21. Riprap part
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. 2.0 t per piece inside and outside harbor
- 26. Consolidation blocks
- 27. Precast concrete armor units
- 28. Wave dissipation riprap
- 29. Other
- 30. Design data
- 31. Wave height
- 32. Unknown
- 33. Period
- 34. Wave pressure
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope
- 40. Condition of levee body damage
- 41. Dispersion of overlay
 42. 75.0 m extension of 670 m³ outside harbor; 75.0 m extension of 780 m³
- inside harbor
- Dispersion of foundation mound
 75.0 m extension of 700 m³ outside harbor; 75.0 m extension of 1120 m³ inside harbor

- 45. Dispersion of consolidation blocks
- 46. Dispersion of dissipation works
- 47. Natural conditions
- 48. Visual measurement
- 49. Wave direction
- 50. Tidal wave
- 51. Duration
- 52. Wind velocity
- 53. Average ENE 15.7 m/sec; peak ENE 30.5 m/sec
- 54. Method of restoration
- 55. Blocks in main body that sank and shifted were not restored; a consolidation works was made on the outer side by 2 lines of blocks and the damaged overlay and foundation mound on inner side were restored to the original condition.

Whole Lamor Car A 1804

被災施設位置図



UNCLASSIFIED

PORT AND HARBOUR RESEARCH INST TOKYO (JAPAN)
DISASTERS OF BREAKWATERS BY HAVE ACTION (2).(U)
MAR 75 H TAKEYAMA, T NAHAYA.4A

ACSI-K6472

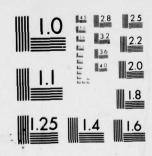
NL

SOCO
ROBORD

ACSI-K6472

NL

50F(D) AD A036006



MICROCOPY RESOLUTION TEST CHART NATIONAL BUREAU OF STANDARDS-1963

48 年

E

港

46. Sakai Harbor

Key:

- 1. Location of damaged facilities
- 2. Damaged section
- 3. Outer harbor sector

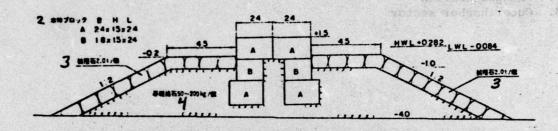
-- 070 --

をまっよう物語製造者

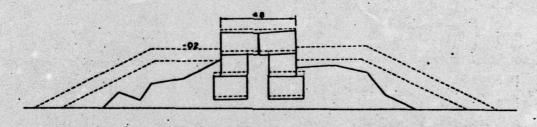
2325-51885

selutional backupi la cultural

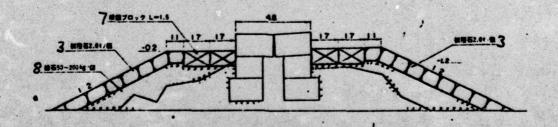
被災前断資図(A-A)



後災時断面図(A-A)
··· S



復旧新面間(A-A)



46. Sakai Harbor

ara Hara a ang anjaran

可能的可以 等 的 等 图 (A.S.

PARTH

· 水山黄砂

Key:

- 1. Cross section A-A prior to damage
- 2. Main blocks
- 3. Overlay
- 4. Foundation mound
- 5. Cross section A-A at time of damage
- 6. Restored cross section A-A

200 年 年 200 m

文艺 中 海 飞行 相

- 7. Consolidation blocks
- 8. Riprap

a A M X

AND THE PARTY OF THE PARTY AND THE PARTY AND

ALONG BETAR AND ARTICLES TO AGRACIATION ARE THE STATE

45 8 8 8 45 8

| | | | | 地区游流堤 | L | B構造株式 4枯プロッ | | | | | |
|----------|----------|-----------------|------------------|------------------------|---|------------------------------------|----------------------------------|--|--|--|--|
| 完成年 | 年月日 | - | | 月31日 | 7被災年月日 7昭和 | | 9(表 雨) | | | | |
| 被状 | 10 克 | | | | | され,8.0 t/倒テトラ 更に沈下したものである。 | | | | | |
| | 13 | | | 寸 15 性 | - warrack to | SOLT IN ALL O | A20136 Mic 37 18 July 1 April | | | | |
| | | | 14 L | コン161-1 | - | Aruk makdona resi | na beloimos | | | | |
| 12 | 立 | | , . | 跌 17 筋 | 1- | : | psydts. | | | | |
| * | * | | | 中 18 時 | | | | | | | |
| | | 上部場所打= | | ンクリート | - | - : | | | | | |
| | 20 | | 24 石 | - | | | | | | | |
| 災 | - | Endocate | I | - | | | | | | | |
| | 5 | | 33,, | - | | | | | | | |
| | 都 | | 4., | 8.0 t/個テトラボッド 2.5 | | | | | | | |
| 的 | | 拼放 | 1 石 | te 1.34 | | | | | | | |
| | 274 | 0 1 | b | 2 14 | | | | | | | |
| | 28 82 | H 97 | . 24 | 数 29 高 | 不明30 | 被 30a E | 不明30 | | | | |
| | - | | | 周 294 期 | | 시31분 최 | 不明30 | | | | |
| | 32 | 13 | | 多すべり | + | | | | | | |
| | 翟 | 部 20 拾 | | 36 福 朝 | | | | | | | |
| 3/ | 爽 | | | 最後の状況 | | | | | | | |
| | 數 | | | 10 数 和 | | | | | | | |
| | " | 石 | | おの数数 | | | | | | | |
| 爽 | | # | 板間プ | 38,70数数 | 등 경우 전 전 전 [18] (18) 전 경우 전 전 전 전 전 전 전 전 전 전 전 전 전 전 전 전 전 | | | | | | |
| | | | | | 延長1.90m, 数量 | रज़ 40 | | | | | |
| | - | 27 | 677-120 Constant | 6 他 | +- | <u> </u> | I | | | | |
| 時 | 4 | H | | 29 * | 本男30 | 10 29a M | | | | | |
| • | 自然 | 条件 | 被 | 42 向 | 不明30 | | 不明30 | | | | |
| | | | 稚 | 62 ⁴ /44 R3 | 不明30 | ■ 45 差 | 1. | | | | |
| a | 46周方 | 法 : | + 1. | | | 3.2 t/信 テトラポッ 78.0 m として、8.0 t/ | | | | | |

47. Etsu Harbor

- 1. Regional facility name
- 2. Goda district training levee
- 3. Construction method
- 4. Riprap block slanting breakwater
- 5. Date completed
- 6. 31 Mar. 1960
- 7. Date damaged
- 8. 23 July 1965
- 9. Heavy, rain
- 10. Damage status
- 11. The heavy rain caused flood conditions in the Egawa river and washed out the normal basin; there was further subsidence of the slanting levee of 8.0 t tetrapods which had been damaged previously (No. 5 storm in 1965 and No. 13 in 1964).
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. Riprap part
- 21. Foundation mound
- 22. Overlay
- 23. Consolidation blocks
- 24. Precast concrete armor units
- 25. 8.0 t tetrapods
- 26. Dissipation riprap
- 27. Other
- 28. Design data
- 29. Wave height
- 29a. Period
- 30. Unknown
- 30a. Wave pressure
- 31. At time of damage
- 31a. Angle of incidence
- 32. Amount of damage
- 33. Levee body slide
- 34. Levee body slope
- 35. Condition of levee body damage
- 36. Dispersion of overlay
- 37. Dispersion of foundation mound
- 38. Dispersion of consolidation blocks
- 39. Dispersion of dissipation works
- 40. 1.90 m extension, amount unknown

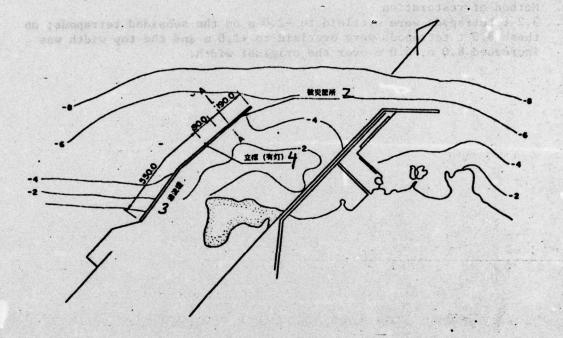
- 41. Natural conditions
- 42. Wave direction
- 43. Tidal level
- 44. Duration
- 45. Wind velocity
- 46. Method of restoration
- 47. 3.2 t tetrapods were overlaid to -2.0 m on the subsided tetrapods; on these 8.0 t tetrapods were overlaid to +1.0 m and the top width was increased 8.0 m, 4.0 m over the original width.

-- SEL ---

Buchal beogramma.

Light Statestan

被災施設位置倒

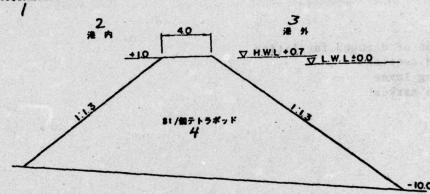


003

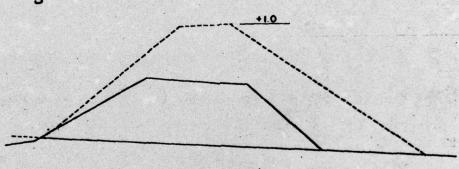
47. Etsu Harbor

- 1. Location of damaged facilities
- 2. Damaged section
 3. Training levee
 4. Lighted marker

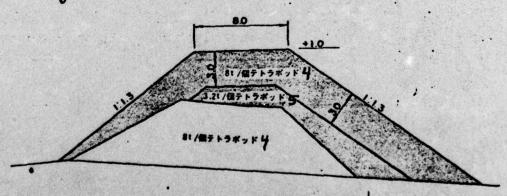
被災前断面閃(A-A)



被災時断面図(A-A) S



復旧新面図(A-A)



Etsu Harbor

Note | 图 美轮 数]

Key:

- 1. Cross section A-A prior to damage
- Inner harbor
 Outer harbor 3.
- 4. 8 t tetrapods
- 5. Cross section A-A at time of damage

AZ Makakatinonishing sangar

end there each and the contract and the contract and TO A PRINCIPAL PROPERTY AND CARREST MARKET THE

5条图 图

E111年 3 次上版

6. Restored cross section A-A

· 大學工 ······

A TOWN THAT THE PARTY AND THE

(京都) 高生多年表示法

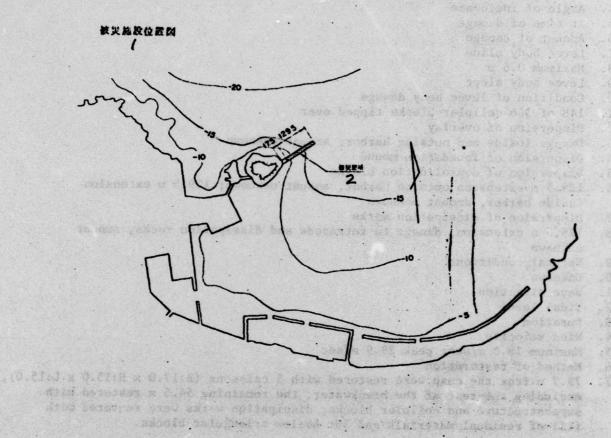
marane barrent neri laves democrate conse そうまは中国とい事情報の報路をモニニーの水を加まれた様とは企業ともを含む

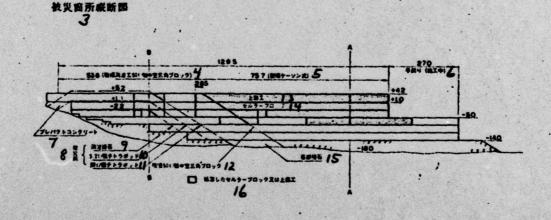
| /地 | 区施 | 段名 | 2西 | 访 族 堤 | L | | ープロック式混成块 | | | | | |
|-----|------|--------------------|--------------|---------------------------|---|--------------------------------------|--------------------------------------|--|--|--|--|--|
| 完成 | 年月日 | 6时和 | 45年3 | 月25日 | 7被災年月日 8昭和 4 6年 | 1月4日 | 9(低気圧) | | | | | |
| 被状 | 10 规 | トに | 倒壊し港 | 外内の被災三方 江が施してあり | 端から75.7mは上部工と 6錐、基礎恰石が敷乱した。 , その消波工が概ね全延長 // | また、陸側からさ | 3 5.6 mはテトラポッ | | | | | |
| | 13 | 14 + 2 - 7 - 7 - 7 | | す /5 柱 | A型 4.0×3.0×3.0× セメント使用量340kg/ | | C | | | | | |
| | 立 | | | 鉄 2/ 筋 124kg/m² SR24 : | | | | | | | | |
| /2 | 部 | | # 2 | | | | | | | | | |
| | | 上部場所打二 | | ンタリート セメント使用量 230kg/m² 25 | | | | | | | | |
| | 26 | 3 A | 27 石 | 50~150k | 8/個 28 ・ | 11 | | | | | | |
| 災 | 捨 | 被 | 19 I | 卷外, 3.0 t/ | 港外, 3.0 t/ 棚三方錐 30 港内, 3.0 t/ 網三方錐, 3.2 t/ 個テトラポッド | | | | | | | |
| | 6 | | 36,0 | 2.0 × 1.5 × 3.0 3 | | | | | | | | |
| | 部 | | 33., | | | | | | | | | |
| 前 | | 稍着 | 拾 石 | 50~150kg/關(陸例35.6m)36 | | | | | | | | |
| | 37+ | 0 | 他 | t 138 | | | | | | | | |
| | 10. | 39 H B | . t s | 故 40 高 | H 1/3 = 6.0 m | 被 4/ H | 斯技技 42 | | | | | |
| | | | | 周 43 期 | | 入44射 角 | β=0° | | | | | |
| | MC | 温 | | 047 ~ 9 最大0.6m 18 | | | | | | | | |
| | 46 | 部 | | 祖 有 科 | | | | | | | | |
| 45 | 类 | | | 政策の状況 | | 間のうち1481 | 間転倒 51 | | | | | |
| | | 26 | | 10 数 和 | | | | | | | | |
| | 数 | 石 | | 老 数 私 | | | | | | | | |
| 炎 | | 部 | 根周フ | 55,00数乱 | 酷外, 延長129.5 m. 数 | . 数量不明 ⁵ 港内,延長129.5m,数量不明 | | | | | | |
| | | | 梢 被 | 手70 数 乱 | 延長129.5m, テトラボ | ッドおよび消波 | 石の被災数量不明 58 | | | | | |
| | | 37 | t | o '他 | | | , | | | | | |
| 149 | 1 | ~ | 被 | 40 A | H 1/3=8.0 m (推算) | 四 43 和 | 不 明 60 | | | | | |
| | | 59 鼓 | | 6/ 向 | NNW · | # 62 8 | +1.1 1 m | | | | | |
| | | | 63 N | 続 時 間 | 不明心 | M 67 2 | 数大 18.0 m/sec 65 网数 29.9 m/sec 65 | | | | | |
| Ø. | 66 方 | 楼 | し残 | 954.5 mは上 | 残壊体を除去しケーソン() 部工およびセルラープロック プロックにて摘放工を復旧し 67 | を復旧し残材を | L 5.0) 5前にて復旧 | | | | | |

48. Hamada Harbor

- 1. Regional facility name
- 2. West breaker
- 3. Construction method
- 4. Cellular block composite breakwater
- 5. Date completed
- 6. 25 Mar. 1970
- 7. Date damaged
- 8. 4 Jan. 1971
- 9. Low pressure
- 10. Damage status
- 11. Three steps of cellular blocks from the superstructure for 75.7 m from the cusp out of 129.5 m were damaged and fell over; wave-damaged 3-way auger and foundation mound on inner side were scattered. Further, dissipation works made 35.6 m from the land side with tetrapods were generally overreached and scattered and many cellular blocks tipped over.
- 12. Prior to damage
- 13. Vertical part
- 14. Cellular blocks
- 15. Dimensions
- 16. A-type, B-type, C-type
- 17. Thickness
- 18. Rest the same
- 19. Concrete
- 20. Cement used 340 kg/m³
- 21. Reinforcing steel
- 22. Fill
- 23. Mid-water concrete, unit volume weight 2.3t/m³
- 24. Upper concreting in site
- 25. Cement used 230 kg/m3
- 26. Riprap part
- 27. Foundation mound
- 28. Per piece
- 29. Overlay
- 30. 3.0t 3-way augers outside harbor; 3.0t 3-way augers and 3.2t tetrapods inside harbor
- 31. Consolidation blocks
- 32. Inside harbor
- 33. Precast concrete armor units
- 34. 20.0t and 3.0t tetrapods (landside 35.6 m)
- 35. Dissipation riprap
- 36. 50-150 kg/piece (landside 35.6 m)
- 37. Other
- 38. None
- 39. Design data
- 40. Wave height
- 41. Wave pressure
- 42. Clapotis
- 43. Period

- 44. Angle of incidence
- 45. At time of damage
- 46. Amount of damage
- 47. Levee body slide
- 48. Maximum 0.6 m
- 49. Levee body slope
- 50. Condition of levee body damage
- 51. 148 of 366 cellular blocks tipped over
- 52. Dispersion of overlay
- 53. Damage inside and outside harbor, amount unknown
- 54. Dispersion of foundation mound
- 55. Dispersion of consolidation blocks
- 56. 129.5 m extension outside harbor, amount unknown; 129.5 m extension inside harbor, amount unknown
- 57. Dispersion of dissipation works
- 58. 129.5 m extension, damage to tetrapods and dissipation rocks, amount unknown
- 59. Natural conditions
- 60. Unknown
- 61. Wave direction
- 62. Tidal level
- 63. Duration
- 64. Wind velocity
- 65. Maximum 18.0 m/sec; peak 29.9 m/sec
- 66. Method of restoration
- 67. 75.7 m from the cusp were restored with 5 caissons (B:17.0 x H:15.0 x L:15.0), excluding the rest of the breakwater; the remaining 54.5 m restored with superstructure and cellular blocks; dissipation works were restored with fill of residual materials and 50t hollow triangular blocks.





48. Hamada Harbor

Key:

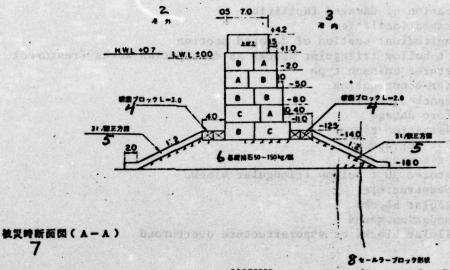
- 1. Location of damaged facilities
- 2. Damaged facilities
- 3. Longitudinal section of damaged section
- 4. 50 t hollow triangular blocks as dissipation works (restored)
- 5. Restored caisson type
- 6. Under construction
- 7. Prepacked concrete
- 8. Before damage
- 9. Dissipation riprap
- 10. 3.2 t tetrapods
- 11. 20 t tetrapods
- 12. Restored 50 t hollow triangular blocks
- 13. Superstructure
- 14. Cellular blocks
- 15. Foundation mound

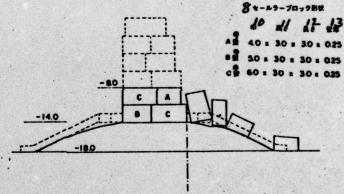
44 14 44

010 - 42 - 62 - 62 Pa

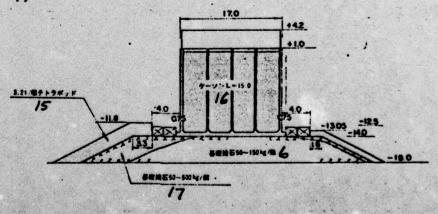
16. Cellular blocks or superstructure overturned

被災前断面図(A-A)





復旧断面図(A-A) 14



48. Hamada Harbor

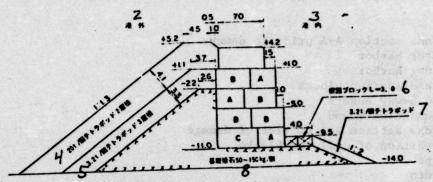
18-83的扩张商品级

《基本基本股票的物质值

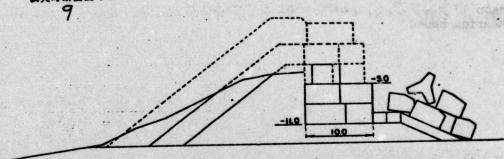
[4] 第一年] 的最级需要

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Consolidation blocks
- 5. 3 t 3-way augers
- 6. Foundation mound
- 7. Cross section A-A at time of damage
- 8. Condition of cellular blocks
- 9. Type
- 10. Width
- 11. Height
- 12. Length
- 13. Wall thickness
- 14. Restored cross section A-A
- 15. 3.2 t tetrapods
- 16. Caisson
- 17. Foundation mound

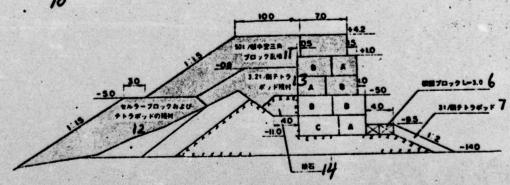
被災前断面図(B-B)



被災時断面図(B-B)



復旧新蔵図(B-B)



1 355

48. Hamada Harbor

max bar to al

告 宏 衛 盛

Key:

- 1. Cross section B-B prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Two layers of 20 t tetrapods
- 5. Three layers of 3.2 t tetrapods
- 6. Consolidation blocks
- 7. 3.2 t tetrapods
- 8. Foundation mound
- 9. Cross section B-B at time of damage
- 10. Restored cross section B-B
- 11. 50 t hollow triangular block random rubble
- 12. Cellular block and tetrapod debris
- 13. 3.2 t tetrapod debris
- 14. Riprap

AND AND THE PARTY OF THE PARTY

我心不是在一部 飞车 跳 这样简单了由这本中的证明

T male | 数 65 概 |

MARKET TOWNS IN A ST. OF

CL 18 ME MAR MAINES TOWNS

⑩ 和歌山下津港

| Contract of | 半月日 | 618 | 2 前卷 | | Lumann | 明和 4 6 年 8 | | | 9 (台版23号) | | |
|-------------|--------------------|--------|--------------|----------------------------------|-------------------------------|---------------------------|----------------------|-----|---|--|--|
| 被状 | | 当以 2 6 | 放堤はへ | | t, 1260m た、陸側から3 | 完成していたが 15m延びた場 | 、この区域 | 内の | 7、口成と3つパケーソンに飛び飛び クロ区間で被覆石。兼 | | |
| | 13 | | | 寸 15 株 | B H 11.0×10.0 | L B ×8.5, 13.0× | H L 0.0×8.5 | 傳驗 | 0.35 隔壁 0.2 底盤 0 | | |
| | 立 | 1 | - "" | コンタリート | σ ₂₀ = 2 1 0 kg/cm | | | | | | |
| 12 | | ' | 4 | 株 18 版 中 19 路 | 7.0.6kg/m² | | 斯拉什袋 | | 100.60 | | |
| 被 | 部 | 1-85 | 经所打2 | ンクリート | | 學位体積重量 2.0 t/m² | | | | | |
| | 25 | 2 | 22 石 | 10~200kg | 150kg/cd | | 6.135.05 6.135.05 | + | 2001 1,25 | | |
| 災 | 槍 | 被 | 24 I | 権外内とも、 捨石 1.0 t/個 26 | | | | | | | |
| | 石 | | 37,1 | 継外内とも. | B H L 4.0 × 1.5 × 3.2 28 | | | | | | |
| | 都 | 稍嵌子9,9 | | ts L30 | | | | | | | |
| 前 | | | 3倍石 | t L 30 | | | | | | | |
| | 32+ | 0 1 | NB . | te 130 | 11.6-62- | | | | | | |
| | 12 | 33 | ! # ! | 故 34 高 | National States | 3 m | 被 3.5 | | (H1/3=5.5m衡學 | | |
| | | 13 | Γ | 期 37 期 ガナベり | | | 入38 射 | A | S 4 4°W | | |
| | 40 | - | | 8 + ペ り な し 30 4 を 概 数 な し 30 | | | | | | | |
| 39 | | 部 | | 43 の状況 | | - ソン 2 6 函 K 龟梨 <i>44</i> | | | | | |
| 被 | 災 | | | 450 M A | | | | | 3. tel 46 | | |
| | 數 | 捨 | | 5 6 数 al | | | | | | | |
| 类 | 2 | 石部 | 根固プ | 1990散乱 | | | | | | | |
| | | ap | 消放 | 10 N A | - | | | | | | |
| | | 32 | t | o 16 | | | | | . ' | | |
| 19 | S | 2 | 被 | 34 🛎 | H 1/3 = 2. | 6m(英例)53 | 周 37 | 期 | 1 1.7 ex | | |
| | 7 50 2 50 10 10 10 | 自然条件 故 | | 54 m | 不明 55 | | m 56 | 做 | | | |
| | | | 杜 | 105 7st 10 | 不明幻 | 5 | M 58 | * | 学的 NNE 581m/s 時最 NNE 13.0m/s | | |
| W. | 60 H % | 曲 | 1/1 | リ六門プロック | にて復旧した。 を除去し港外内 | また、心裂の | 入ったケー | 770 | る 拾石のかわりに 2.0 のうち最も被害の大き プレパタトコンタリー | | |

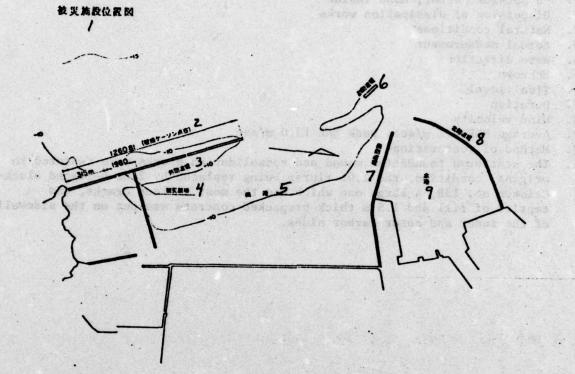
49. Wakayama Shimozu Harbor

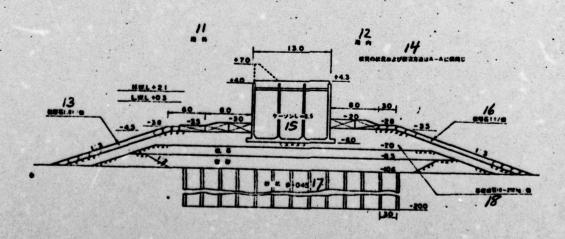
- 1. Regional facility name
- 2. South outer harbor breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 30 Aug. 1971
- 9. Typhoon No. 23
- 10. Damage status
- 11. 1260 m of the present breakwater, excluding the parapet, but 26 caissons in this section cracked. In addition, overlay, foundation mound, and consolidation blocks in the 198 m sector from a site extending 315 m from the land side were scattered and damaged.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.35, compartment wall 0.2, base plate 0.7
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Sand. Unit volume weight 2.0t/m³
- 21. Upper concreting in site
- 22. Foundation mound
- 23. Per piece
- 24. Overlay
- 25. Riprap part
- 26. 1.0t riprap inside and outside harbor
- 27. Consolidation blocks
- 28. Inside and outside harbor
- 29. Precast concrete armor units
- 30. None
- 31. Dissipation riprap
- 32. Other
- 33. Design data
- 34. Wave height
- 35. Wave pressure
- 36. Breakers (H1/3=5.5 m shock wave)
- 37. Period
- 38. Angle of incidence
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. Cracks in 26 caissons
- 45. Dispersion of overlay

- 46. 198.0 m extension of 560 m³ outside harbor; none inside
- 47. Dispersion of foundation mound
- 48. 198.0 m extension of 190 m³ outside harbor
- 49. Dispersion of consolidation blocks
- 50. 90 outside harbor; none inside
- 51. Dispersion of dissipation works
- 52. Natural conditions
- 53. Actual measurement
- 54. Wave direction
- 55. Unknown
- 56. Tidal level
- 57. Duration
- 58. Wind velocity
- 59. Average NNE 8.1 m/sec; peak NNE 13.0 m/sec
- 60. Method of restoration
- 61. The scattered foundation mound and consolidation blocks were restored to original condition, the 1.0t riprap being replaced by 2.0t 6-legged blocks. Caisson no. 138, a large one which had the most serious cracks, was emptied of fill and 1.5 m thick prepacked concrete was put on the sidewall of the inner and outer harbor sides.

49 和歌山下津港

would multiplifuence to coleton in





49. Wakayama Shimozu Harbor

- 1. Location of damaged facilities
- 2. Scattered damaged caissons
- 3. Outer breakwater
- 4. Damaged section
- 5. South harbor
- 6. Breakwater
- 7. South breakwater
- 8. North breakwater
- 9. Main harbor
- 10. Cross section B-B prior to damage
- 11. Outer harbor
- 12. Inner harbor
- 13. Overlay
- 14. Damage status and method of restoration same as A-A
- 15. Caisson
- 16. Overlay
- 17. Sand resistance
- 18. Foundation mound

報信石、作業プロック等後突然落しー196.9 乙 4-22 WHEN 2011 4 No.137 その他はMile 4、 A. M. Maroouths-1m. Runoouthi-4m S いずれらしがし 即来より上 M.Mommus 年として発表に辿って作ることのグンジ・コンジリートを放工する。 F. 136

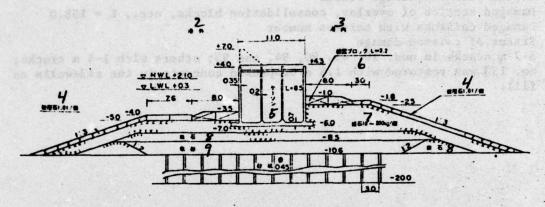
被技能所中国およびケーンン破壊状況図

49. Wakayama Shimozu Harbor

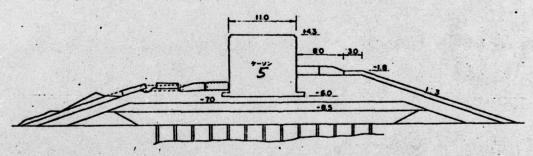
- 1. Ground plan and damage status
- 2. Damaged section of overlay, consolidation blocks, etc., L = 198.0
- 3. Damaged caissons with caisson number
- 4. Status of caisson damage
- 5. 5-7 m cracks in nos. 10, 45, 90, 94, and 95; others with 1-4 m cracks; no. 138 was restored with 1.5 m prepacked concrete in the sidewalls as fill.

49 和歌山下津港

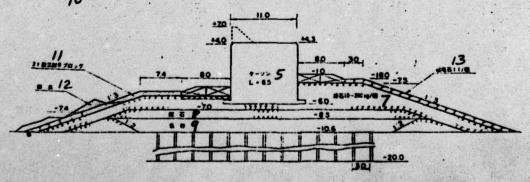
被災前断面関(A - A)



被災時断面図(A-A)



復旧新面図(A-A)



49. Wakayama Shimozu Harbor

AND THE RESERVE OF TH

more and was to a wife

· 概念 数数 20.00m

nes well

機能にある他の意味ができます。ことのとのできるは、とはできれた時代はは 構造とはは必要と、機能は必要に対しませんが必要に対象のとなる機能を表

28.25

M PE NO

45%

WESTERN BE

差 法 部 策

Key:

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Overlay
- 5. Caisson
- 6. Consolidation blocks
- 7. Riprap
- 8. Miscellaneous stone
- 9. Sand
- 9a. Cross section A-A at time of damage

The same make that the property more was need by the S

10. Restored cross section A-A

201-feeds minimum, blit both

THE RM. MATTER. III W

20 1 2 m

的现在分词在外部上被 光龙 词

- 11. 2 t 3-legged blocks
- 12. Removed
- 13. 1 t overlay

50 日和佐港

| /地 | 区施 | 段名 | 2批 18 | 放堤 | 第道株式 4プロック式混成堤 | | | | | | |
|------------|------------|------------|---|----------------------|--------------------------------------|--------------|-------------|------|--------------------------|--|--|
| 完成年 | 年月日 | 6昭和 | 110年3 | 月20日 | 被灾年月日 昭和 4 3年7月28日8 9(台版4号) | | | | | | |
| 被状 | 10 克 | | 内とも基 | | , 松園プロッ // | クが散乱した。 | 特に堤頭部 | 事に於 | いては枯石,根間ブ | | |
| | 13 | | | 寸 15 株 | 不明6 | | alfar | Ni a | or faither by | | |
| | 立 | 7 | 277 | 3794 | 1:3:6 | | | | | | |
| 被 | 部 | | 14 | | | | | | | | |
| 12 | ab. | 上部 | ₩## ²⁴ | アンクリート | 1:3:6 A MARINE MARINE SANCE SANCE A | | | | | | |
| | 21 | | 1225 | 50~100kg | /包22。 | | | | and some i | | |
| 英 | 搶 | 被 | 度 種 ²³ 工 港外内とも、捨石 2.0 t/個 24 | | | | | | | | |
| | 75 | | 155, | 着外内とも, | コンクリート: | プロック 2 0.0 t | 1826 | | | | |
| | 部 | | 1271 | t L28 | | | | | | | |
| 10 | _ | | · 篇9石 | | | | | | | | |
| | 30 t | | 他 | tt L 28 | | | | | | | |
| | 100 | 3/· H 9 | Ħ | 被 32 高 期 35. 期 | H 1/3=5.0 |) m | 故 33 | 角 | 野 数 34 B=0° | | |
| | | 13 | 25 体 | 39+ ~ 0 | t L 28 | A Company | 7.36 43 | | | | |
| | 38 | | | 46 桶 料 な し 28 | | | | | | | |
| 37 枝 | 2 | 都 | 提体 | 140状况 | te L 28 | | | | | | |
| i | | 21 | 被概 | 岩心版品 | 港外,延長 | 40.0m, 1,500 | · 港内. | 延長 | 33.0m. 800m 43 | | |
| | 數 | 五 基 (| | 相心 数 乱 | 卷外. 延長 | 40.0m, 600 | · 港内, | 延長 | 20.0m. 400m 45 | | |
| 莱 | 2 | 据 极固 | Marking Review | 4610数乱 | 卷外、延長 20.0m, 20個 港內, 延長 10.0m, 13個 4 | | | | | | |
| | | | | ₩ a | | | | | | | |
| | | 30 | t | O 16 | | | | | | | |
| 時 | 4 | 19 | 被. | 32 A | H 1/3=4.5 | • | m 35 | 期 | 1 2 sec | | |
| | 自然 | 条件 | 故 | 50 向 | SE | | m 51 | 位 | +2.9 m | | |
| 1/2 | | | | 852時間 | 不明6 | | x 53 | | 時载 SE 2 6.2 m/set | | |
| a 1 | 55 IB 方 | # | | した各部の復旧は 所蔵工を施工し、 | | | | | で本体と同じ天命であり、 | | |

50. Hiwasa Harbor

Key:

- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 20 Mar. 1935
- 7. Date damaged
- 8. 28 July 1968
- 9. Typhoon No. 4
- 10. Damage status
- 11. Foundation mound, overlay, and consolidation blocks were scattered inside and outside harbor. Both riprap and consolidation blocks were washed away on the breakwater head.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 22a. Per piece
- 23. Overlay
- 24. 2.0t riprap inside and outside harbor
- 25. Consolidation blocks
- 26. 20.0t concrete blocks inside and outside harbor
- 27. Precast concrete armor units
- 28. None
- 29. Dissipation riprap
- 30. Other
- 31. ! Design data
- 32. Wave height
- 33. Wave pressure
- 34. Breakers
- 35. Period
- 36. Angle of incidence
- 37. At time of damage
- 38. Amount of damage
- 39. Levee body slide
- 40. Levee body slope
- 41. Condition of levee body damage
- 42. Dispersion of overlay
- 43. 40.0 m extension of 1500 m³ outside harbor; 33.0 m extension of 800 m inside harbor
- 44. Dispersion of foundation mound
- 45. 40.0 m extension of 600 m³ outside harbor; 20.0 m extension of 400 m³ inside harbor

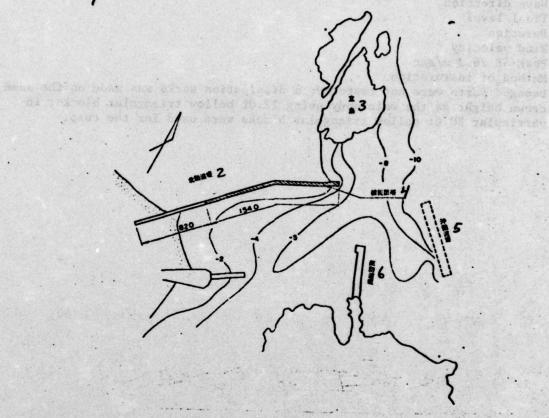
233

- 46. Dispersion of consolidation blocks
- 47. 20.0 m extension of 20 blocks outside harbor; 10.0 m extension of 13 inside harbor
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Wave direction
- 51. Tidal level
- 52. Duration
- 53. Wind velocity
- 54. Peak SE 26.2 m/sec
- 55. Method of restoration
- 56. Damaged parts were not restored; a dissipation works was made on the same crown height as the main body using 12.0t hollow triangular blocks; in particular 20.0t hollow triangular blocks were used for the cusp.

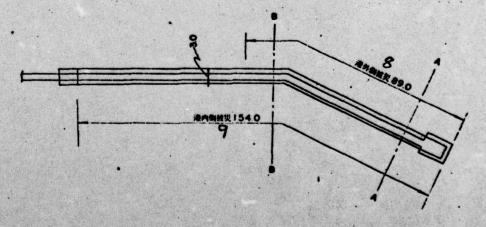
harpers on at essengiton works

被災施設位置図

ablent to the column tes a C



後災舊所平面図 7



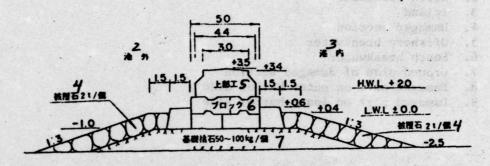
50. Hiwasa Harbor

系外表) 跨接商额发送

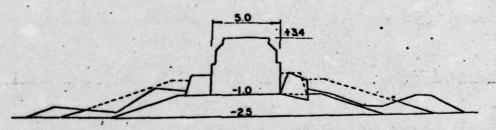
- 1. Location of damaged facilities
- 2. North breakwater
- 3. Island
- 4. Damaged section
- 5. Offshore breakwater
- 6. South breakwater
- 7. Ground plan of damaged section
 8. Damaged part on outer harbor side
 9. Damaged part on inner harbor side

50日和佐港

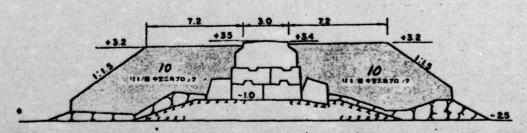
被災前断面図(A-A)



被災時斯面図(A-A)



後日所有間(A-A)



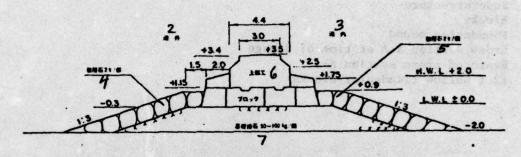
50. Hiwasa Harbor

(8-8)的数据处理器

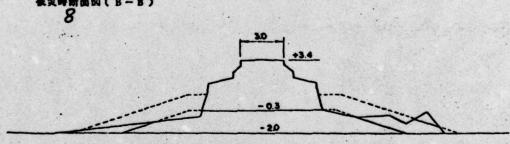
- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Overlay
- 5. Superstructure
- 6. Blocks
- 7. Foundation mound
- 8. Cross section A-A at time of damage
- 9. Restored cross section A-A
- 10. 12 t hollow triangular blocks

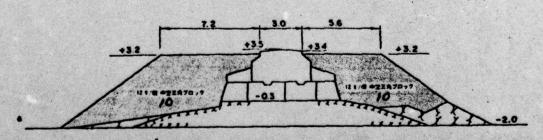
50 日 和 佐 港

被災前断面図(B-B)



後災時新面倒(B-B) 8





50. Hiwasa Harbor

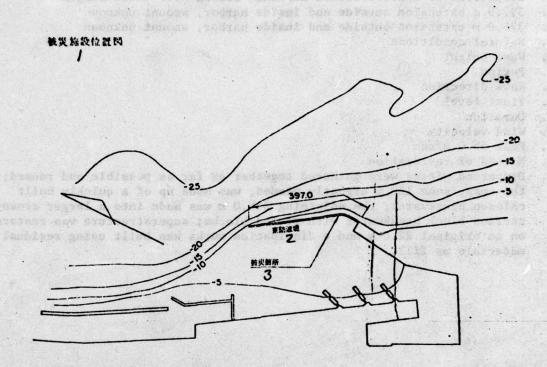
Key: Cross section B-B prior to damage Outer harbor Inner harbor Overlay 5. Overlay 7. Foundation mound 8. Cross section B-B at time of damage 9. Restored cross section B-B 10. 12 t hollow triangular blocks a of the analysis and the analysis of BERT STAR ABOTEBA (1 m m m 02 m 型 源 落 · 学是 · 佐 · 母至早海 ZZ nich with the Will the ZZ nich and the Line and the Li 中央本学研究的特殊的企业工作的企业工作的创作的企业工作的企业工作工作。 TO STANDS OF THE STANDS

| 完成年月日 | | 大正 | 3年~昭 | 和9年6 | 被災却月日 | 昭和 4 5年8 | 月21 | 811 | | 90 | 台周 1 | 0号) |
|-------|-----------------|---------------|-------------------------|-------------------------|----------------------|--|----------|--------|-------|-------|----------|--------|
| 被状 | 0 炭 | リー | | . 被復石。基礎 | | 7.0mのうち37 残り 2 2 mは上記 | | | | | | |
| | 13 | | | 寸 15 株 | | 1 × 1.5 2 | B 1.8 | 2 × 1. | 2 1 × | 1.5 2 | | |
| | 立 | 70 | 7 | コンクとート 鉄 18 筋 | | | | | | | | |
| 2 | # | 上部場所打2 | | 中月路 | - | | | | | | • | |
| | | | | Qンクリート 不明/7 | | | | | | | | |
| | 21 拾 | # 6 | 22 石 50kg/衛以下 23 | | | | | | | | | |
| 英 | _ | 枝 | 光,, | | 拾石 2 0 0 ~ 6 | 0 0kg/個25 | | · | | | | |
| | 75 | | - | te L27 | | | | | _ | | | |
| 酌 | 都 | 前被 | | 1 L L 27 | | | | | | | | |
| | 30e | | | tx L27 | | | | | | | | |
| | | 31 | | 被 32 高 | 不明17 | | 枝 | 33 | Æ | 不 | B 17 | |
| | 設 | 計算 | # | 周 34 期 | 不明17 | | 入主 | SAI | 角 | 不 | 男 17 | |
| | 37 | 13 | 提体 | 多ナベり | ts L 27 | | 1 13 | | | | | |
| | 被 | 部堤体 | 提体 | 390 福 斜 | te L 27 | • | | | | | | |
| 被 | 炎 | | 関係の状況 | 全延長に亘て上部工および本体プロック散乱 45 | | | | | | | | |
| 36 | | 21 | 被极 | 生の散乱 | 港外内, 延 | 髮397.0m,数 | 最不明 | 1 46 | | | | |
| ,6 | 数 | 拾石 | * 0 | 岩の散乱 | 港外内,延長375.0m,数量不明 47 | | | | | | | |
| 炎 | 2 | 1 55 E | 根固プ | 好, 力の散乱 | クの散乱 一 | | | | | | | |
| | | | 消被 | 被型の数乱 - | | | | | | | | |
| | | 30 七 0 他 | | | | | | | | | | |
| 時 | | 48 被自然条件 被 | | 49 m | H 1/3 = 3. | 5 m | 阀 | 50 | 期 | 不 9 | 17 | |
| | STATE OF STREET | | | 5/ 向 | 不明17 | | 鹏 | 52 | 故 | + 2.8 | m | |
| | | | 53 RE | 統時間 | 不明17 | | A | 5.4 | 遂 | 瞬载 | 5 5.0 m, | /sec.S |
| a i | 56 油 方 | 挂 | 施工・プロ | の早いケーソン ック巣とした。 | 吸とし、関接・ また元付22. | 放し再似用するだ する225.0 mi 0 mは上部工せる た。 57 | は再使 | 用の: | , a . | クで割 | 面の大 | :21. |

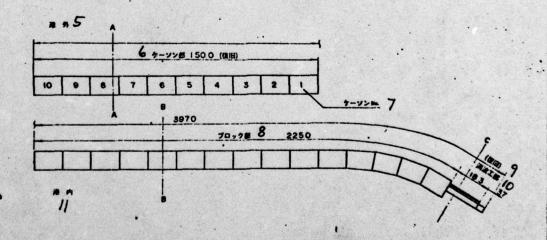
51. Imabari Harbor

- 1. Regional facility name
- 2. East breakwater
- 3. Construction method
- 4. Block composite breakwater
- 5. Date completed
- 6. 1914-1934
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. Most of the riprap mound remained, but upsetting of main blocks and of upper concrete and scattering of overlay and foundation mound occurred over 375.0 m of the total 397.0 m length; the remaining 22 m suffered damage to the overlay.
- 12. Prior to damage
- 13. Vertical part
- 14. Blocks
- 15. Dimensions
- 16. Concrete
- 17. Unknown
- 18. Reinforcing steel
- 19. Fill
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Less than 50 kg/piece
- 24. Overlay
- 25. 200-600 kg riprap inside and outside harbor
- 26. Consolidation blocks
- 27. None
- 28. Precast concrete armor units
- 29. Dissipation riprap
- 30. Other
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Period
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope
- 40. Condition of levee body damage
- 41. Dispersion of overlay
- 42. Dispersion of foundation mound
- 43. Dispersion of consolidation blocks
- 44. Dispersion of dissipation works

- 45. Dispersion of superstructure and main blocks over whole length
- 46. 397.0 m extension outside and inside harbor, amount unknown
- 47. 375.0 m extension outside and inside harbor, amount unknown
- 48. Natural conditions
- 49. Wave height
- 50. Period
- 51. Wave direction
- 52. Tidal level
- 53. Duration
- 54. Wind velocity
- 55. Peak 55.0 m/sec
- 56. Method of restoration
- 57. Dispersed pieces were gathered together as far as possible and reused; the cusp, some 150 m urgently needed, was made up of a quickly built caisson breakwater; the adjoining 225.0 m was made into a larger cross-section block breakwater with reused blocks; superstructure was restored on an original 22.0 m and a dissipation works was built using residual materials as fill.



被災箇所平面図 *以*



51. Imabari Harbor

(4一本) 医胃蛋白发酶

北大一名与维度领域保護等

化国ール (相談が存集

Key:

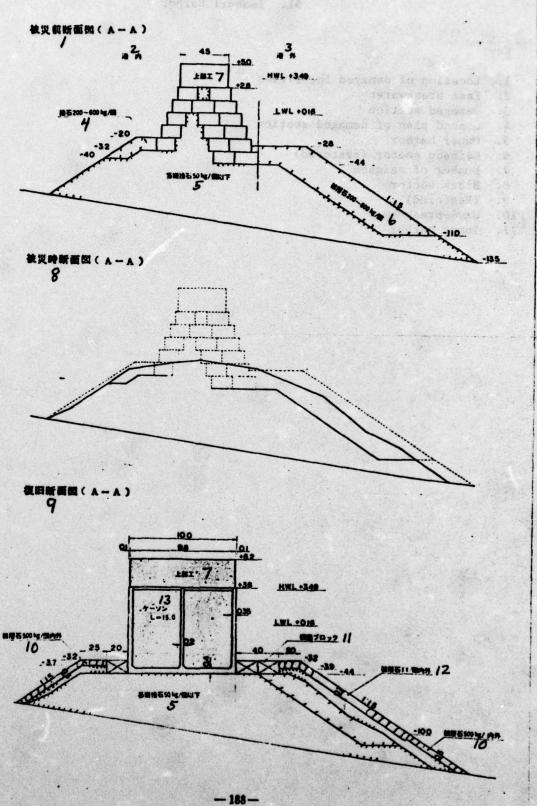
- 1. Location of damaged facilities
- 2. East breakwater
- 3. Damaged section
- 4. Ground plan of damaged section
- 5. Outer harbor
- 6. Caisson sector (restored)
- 7. Number of caisson
- 8. Block sector
- 9. (Restored)
- 10. Wave-breakers
- 11. Inner harbor

中国社会社会总统的条件

第四个人的

W. Exercise

是人 由中華 红海黄绿



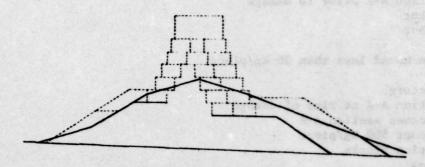
51. Imabari Harbor

元有一年》翻除的研究第

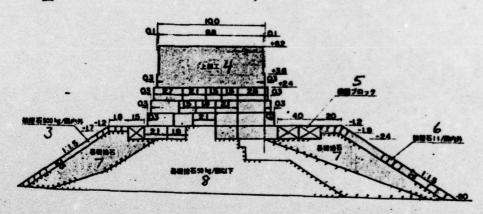
在5 5 数额编辑的

- 1. Cross section A-A prior to damage
- 2. Inner Harbor
- 3. Outer harbor
- 4. Riprap
- 5. Foundation mound less than 50 kg/piece
- 6. Overlay
- 7. Superstructure
- 8. Cross section A-A at time of damage
- 9. Restored cross section A-A
- 10. Overlay about 500 kg/piece
- Consolidation blocks
 1 t overlay
- 13. Caisson

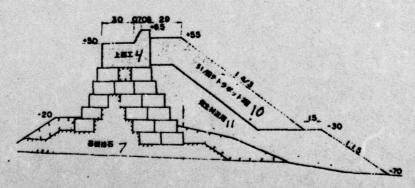
被災時断面図(B-B)



復旧断面図(B-B) 之



復旧新画図 (C-C)



51. Imabari Harbor

Key:

- 1. Cross section B-B at time of damage
- 2. Restored cross section B-B

超過過程之 女一 经自然的特别

- 3. Overlay about 500 kg/piece
- 4. Superstructure

(學也上級數)等

- 5. Consolidation blocks
- 6. Overlay about 1 t/piece
- 7. Foundation mound
- 8. Less than 50 kg foundation mound
- 9. Restored cross section C-C
- 10. Two layers of tetrapods
- 11. From diverted materials

200 T 1

新 艾拉 脑

18 PA

and a residence

主 经产品收益 医电流 至

STIBLEBOOK OF BRIDGE TO STUDY

数据从于中国的企业人们的基础的工事上上有关的特别的企业的企业的企业的主义的

30.783 日朝

1 18

| 地区 | X 施 | 设名 | 2货免 | 第1防被堤 | 500 | 遺標式 イケーソン | 大龍球獎 | | | | |
|-----|-------------|---|-----------|---------------------------|---------------------|--------------|----------------|--|--|--|--|
| 完成年 | 月日 | 6昭和 | 04 4年(| 前波工のみ) | 被炎年月日 昭和 4 5 4 | F8 # 2 1 1 8 | 9 (3風10号) | | | | |
| 被水 | 0 规 | 当防放送は先端部を50.0 k/像中空三角プロック。接幹部を30.0 k/像中空三角プロックで被覆し消波工としているのが最先端部の50.0 k/像中空三角プロックが散乱した。 | | | | | | | | | |
| | | | | + 15 m | 本 明 16 | | | | | | |
| | 13 | | 14 | コンタリート | See Calabid | | | | | | |
| 12 | 立 | 1 | ,, | # 18 % | 不明16 | | Country seed | | | | |
| Ħ | | | | + 19 18 | コンタリート# 20 | 学位件装置包 | 本 明 | | | | |
| | | 上部場所打コン 基 職 治 石 | | 299-121 | v 9 9 - 12/ 1:3:6 | | | | | | |
| | 22 | | | 不 男 16 | | | | | | | |
| 災 | 14 | * | I | 不明16 | | | | | | | |
| | 6 | | ۶£., | | | | | | | | |
| | | 州政36,夕 | | 5 0.0 t/御中空三角プロック乱後 2.8c. | | | | | | | |
| n | | | t 1 5 | # L)8 | | | | | | | |
| | 294 | 0 | Rt. | t L 28 | | | | | | | |
| | | 30 | 14 | # 3/ A | H 1/3=10.0m | # 32 E | | | | | |
| | | /3 | | m 33 m | 1 2.0 sec | 入33.数 角 | <i>β</i> = 0° | | | | |
| | 43 | - | | 34+ × 1 | | | | | | | |
| | * | 立 | 提件 | | # L 28 | | | | | | |
| × | 爽 | | 提件 | 170 数 和 | 2 L 28 | | | | | | |
| 110 | | 22. | * 4 | TOR A | # L 28 | | | | | | |
| 42 | | T | | 37,0 ma | | | | | | | |
| 类 | • | * | | | | | | | | | |
| | | 29 | | 0 16 | _ | | | | | | |
| | | | | 31 🛪 | Hmax = 6.5 m (BM) | /S m 33 m | 1 2 000 | | | | |
| | | 44 良 | | 46 m | SE | m 47 6 | | | | | |
| | | | | 148 mg 123 | 不 男/6 | R 49 X | 献大 51.7m/sec 5 | | | | |
| | | | | | ロックは原形復旧するとと | | | | | | |
| | 51 El 75 | 株 | | | #ケーソン4差を設置した 52 | | | | | | |

845

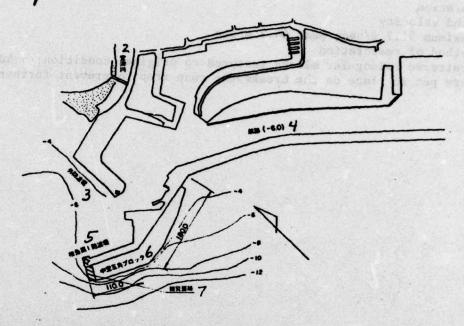
52. Murotsu Harbor

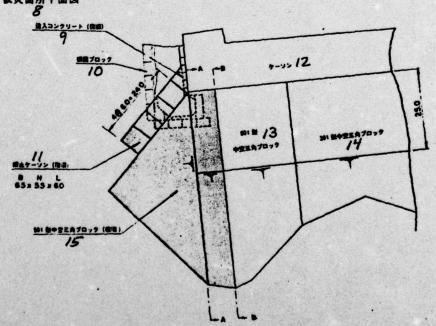
- 1. Regional facility name
- 2. Gomen No. 1 breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. 1969 (dissipation works only)
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. The cusp of this breakwater was overlaid with 50.0t hollow triangular blocks and the main levee body with 30.0t hollow triangular blocks; the 50.0t blocks on the highest cusp, the wave dissipation works, were scattered.
- 12. Prior to damage
- 13. Vertical part
- 14. Caisson
- 15. Dimensions
- 16. Unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Concrete dumps. Unit volume weight unknown.
- 21. Upper concreting in site
- 22. Riprap part
- 23. Foundation mound
- 24. Overlay
- 25. Consolidation blocks
- 26. Precast concrete armor units
- 27. Dissipation riprap
- 28. None
- 28a. 50.0t hollow triangular block random rubble
- 29. Other
- 30. Design data
- 31. Wave height
- 32. Wave pressure
- 33. Period
- 33a. Angle of incidence
- 34. Levee body slide
- 35. Levee body slope
- 36. Condition of levee body condition
- 37. Dispersion of overlay
- 38. Dispersion of foundation mound
- 39. Dispersion of consolidation blocks
- 40. Dispersion of dissipation works
- 41. 98 blocks extended 8.0 m
- 42. At time of damage
- 43. Amount of damage

- 44. Natural conditions
- 45. Visual measurement
- 46. Wave direction
- 47. Tidal level
- 48. Duration
- 49. Wind velocity
- 50. Maximum 51.7 m/sec; peak 64.3 m/sec
- 51. Method of restoration
- 52. Scattered triangular blocks restored to original condition; 4 400t caissons were put in place on the breakwater cusp stop to prevent further damage.

03455 805

被災施設位置図

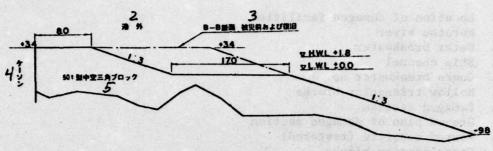




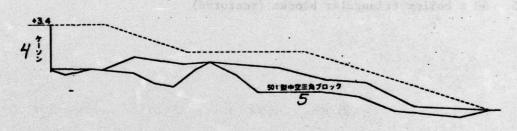
52. Murotsu Harbor

- 1. Location of damaged facilities
- 2. Murotsu river
- 3. Outer breakwater
- 4. Ship channel
- 5. Gomen breakwater no. 1
- 6. Hollow triangular blocks
- 7. Damaged section
 8. Ground plan of damaged section
 9. Poured concrete (restored)
- 10. Consolidation blocks
- 11. Consolidation caisson (restored)
- 12. Caisson
- 13. 50 t hollow triangular blocks
- 14. 30 t hollow triangular blocks
- 15. 50 t hollow triangular blocks (restored)

被災前断面図(A-A)

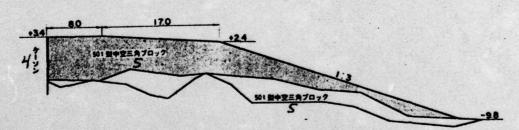


被災時断面図(A-A)



PARSE VALUE STATE TO COUNTY OF

復旧新面図(A-A)



以出於其情報於 自 雅 南 为 在 1

62 1 0 2 8 0 0

分級機約

数 表 报 声

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. B-B prior to damage and restored
- 4. Caisson
- 5. 50 t hollow triangular blocks
- 6. Cross section A-A at time of damage

的文字中的文字,并将"中国文化的企业报告,所以"特别"。

2000年1 图 第 图 图 1200mm 1200mm

以表示作的产生为用主义(Andrews),由于自己是为于。这个一类的数块

7. Restored cross section A-A

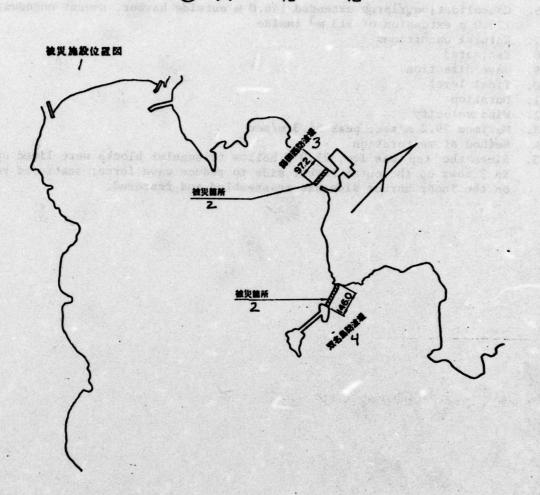
N. 自由工作和支持基本工作。4至10周

| /地 | 区施 1 | 设名 | 2双名 | 岛防护 | 堤 | | | 3構造樣式 | 4487 | 打二 | ンクリート式直立堤 | |
|----|-----------|--|------------|--------------------|------------------|---------------------|---------------------|-----------------|----------|------------|--|--|
| 完成 | 月日 | 不 | 明 6 | 被災年月日 昭和45年8月21日8 | | | | | | 9(台風10号) | | |
| 被状 | の説 | 港外 | 内の根固 | 石が散る | lし本体: // | 基部が 1 部破 | 損した。 | o sola a fan | | | idass seed odess seed odess seed | |
| | 13 | | 14 | 寸 1. | 5 法 | - | 82E5 5 | la zek | a a da a | 10.5 | welled it is | |
| | | The Property of the Control of the C | 打コン | מעם | 1-3 | 不明17 | | ek diki | 12.85 | | Managara. | |
| 12 | 立 | 11 | - F | 鉄 / | 8 15 | - | | | | | | |
| 被 | 都 | | | 中 / | 9 # | | | | | | | |
| | | 上部 | 場所打= | ンクリ | -120 | 1:3:6 | | | | | | |
| | 21 | | 2 括 石 | なし | t L 23 | | | | | | | |
| 災 | 捨 | 被 | | | 23 | | | | | | | |
| | 石 | | 50,1 | なし | 23 | | | | | | | |
| | 郵 | 消波プロック | | was to be the said | 2.3 | | | | | | | |
| 前 | - | 神世 | 捨石 | なし | 23 | | | | | | | |
| | 282 | 0 1 | t | 根固拍 | 石 3.0 t | 0 t/個内外 29 | | | | | | |
| | 2A 80 | 計資 | 151 | 故 3 | / 高 | H $1/3 = 5$. | 0 m | 被 | 32 | Æ | 砕 被 33 | |
| | 24 | | | 周 3 | | 1 2 sec | | <u>\</u> | 35射 | A | β= 2 0° | |
| | 37 被 | | | 38+ | | ts L 23 | | | | | | |
| | | 立 | 7/10/11 | | 傾斜 | t L 23 | | | | | | |
| 被 | 炎 | 部 | | 破損の状況 | | 本体基部が一部破損 41 | | | | | | |
| | | 21 | | 142 | | | | | | | | |
| 36 | 数 | 石 | | E430 | Marie Language | | | | | | | |
| 英 | 2 | 都 | | ロリクの敗乱 | | - | | | | | | |
| | | | | 10 | 散乱 | | - 44 | | | | | |
| | | 28 . | ŧ . | 0 | 他 | | | | | | 内, 延長123.0m 913 | |
| 時 | 自然条件 被 | | 被 | 31 | 高 | H 1/3=5. | Om (推) | 定 48 周 | | | 1 2.0 sec | |
| | | | 被 | 49 | 向 | ESE | | * | | 6 2 | +4.1 m | |
| | | | 51粒 | 統時 | (III) | 不 剪17 | | | 52 | 速 | 股大 29.2m/sec 53 | |
| | 日 方 64 | 推 | 天端 | が低いた例を散品 | . め、港タ . した在4 | 外側に 2 5.0 Sを集めて復 | 1/個中 日L た。 55 | 空三角プロ | 774 | 3列(| て並べ被力を減じ、 | |

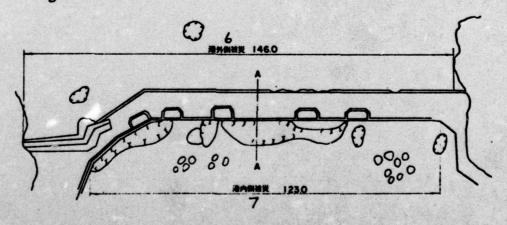
53. Kurei Harbor

- 1. Regional facility name
- 2. Futanashima breakwater
- 3. Construction method
- 4. Placed concrete upright-wall breakwater
- 5. Date completed
- 6. Unknown
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. Consolidation stone on outer and inner harbor sides were scattered and the foundation of the main body was partly destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. Placed concrete
- 15. Dimensions
- 16. Concrete
- 17. Unknown
- 18. Reinforcing steel
- 19. Fill
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. None
- 24. Overlay
- 25. Consolidation blocks
- 26. Precast concrete armor units
- 27. Dissipation riprap
- 28. Other
- 29. 3.0 to consolidation riprap inside and outside
- 30. Design data
- 31. Wave height
- 32. Wave pressure
- 33. Breakers
- 34. Period
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope
- 40. Condition of levee body damage
- 41. Foundation of main body partly destroyed
- 42. Dispersion of overlay
- 43. Dispersion of foundation mound
- 44. Dispersion of consolidation blocks
- 45. Dispersion of dissipation works

- 46. Consolidation riprap extended 146.0 m outside harbor, amount unknown; 123.0 m extension of 913 m³ inside
- 47. Natural conditions
- 48. Estimated
- 49. Wave direction
- 50. Tidal level
- 51. Duration
- 52. Wind velocity
- 53. Maximum 29.2 m/sec; peak 54.3 m/sec
- 54. Method of restoration
- 55. Since the top was low, 25.0 t hollow triangular blocks were lined up in 3 rows on the outer harbor side to reduce wave force; scattered rock on the inner harbor side was reassembled and restored.



被災售所平面因 C



53. Kurei Harbor

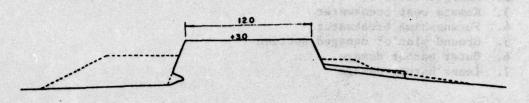
《永一五 3 周 份 開港 長藤

《有一年》及张珠璇以是什

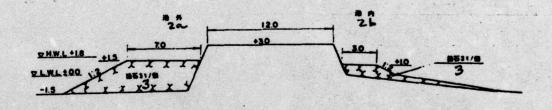
(4-4)国南州山西。

- 1. Location of damaged facilities
- 2. Damaged sections
- 3. Kamata west breakwater
- 4. Futanashima breakwater
- 5. Ground plan of damaged section
- 6. Outer harbor damage
- 7. Inner harbor damage

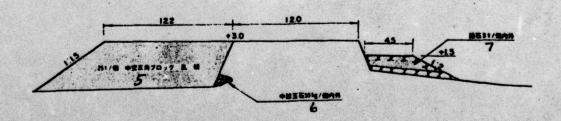
被災前断面図(A-A)



後災時断面図(A-A) 2



復旧新画図(A-A) イ



53. Kurei Harbor

14 排引量器 古法国教子工教物教育 展 湯 ② 正 篇 如

体态文

3 99 左

A. 原型放弃保持 【 A. 在 图 图 图 图 图

古 泰 西 西

海州山美沙林湖

a soltaa asoltaa

158

图 图 机工

84

的数据数据

4 5 0 0

Key:

- 1. Cross section A-A prior to damage [apparently reversed with 2]
- 2. Cross section A-A at time of damage
- 2a. Outer harbor
- 2b. Inner harbor
- 3. Riprap
- 4. Restored cross section A-A
- 5. 25 t hollow triangular block random rubble

· 图形的人。其实中的一位工作工作工作工作的经验。

整 12 集

建工业位于

medita by miror publications of the

6. 30 kg fill

H-186

匈 久 礼 港

| 完成年 | 手月日 5 | 不 | 9 6 | | 被災年月日 | 昭和 4 5 | 年8月2 | 18 | 711 | 9(台版10号 | |
|--------|--------------|----------------------------|-----------------|----------------------|---|------------|-------|--------|-----|----------------------|--|
| 数 10 元 | | 本部が対 | 放機は本 | 体が ま石積でね いるがい ずれの | 及固拾石を有しており、堤頭部は断面が大きく天端にコンクリー の部分も散乱または破壊した。 // | | | | | 天蛸にコンクリート | |
| | 13 | | | 寸 15 ± | T- | | | | 70 | Septem 1 | |
| | | | 14. | コンタリート | us Telepan | should | raing | maks s | - 1 | Also a 15 | |
| | 立 | 14 | | 映 17 筋 | - | | | | | | |
| × | - | | | 中 18 略 | - | | | | | | |
| _ | | 下型 | 為所打= | ンクリート | 1:3:6 | (美麗部水 | 1)20 | | | | |
| 2 | 21 | # 8 | ²² 6 | - | | | | | | | |
| 英 | 拾 | 被名 | | 着外内とも。 | 教石教 | 第石表 | | | | | |
| | 石 | | 77., | - | | | | | | | |
| | - | 稍放了50 | | - | | | | | | | |
| 前 | | mi | 26 石 | | | | | | | | |
| | 274 | ○ 他 模閣拾石500kg/個~1.0 t/個 28 | | | | | | | | | |
| | | 29 | 14 | # 30 M | H 1/3=5.0 | 0 m | * | 31 | Æ | 种 被 32 | |
| | | | | 周 33 期 | 1 2.0 sec | | 7.3 | 44 | A | β=60° | |
| | 36 | 13 提供 | | 6 + ~ 9 | - | | | | | | |
| | * | 立 | 提供 | 0 模 斜 | | | | | | | |
| 被 | 类 | - | 提体引 | 養養の状況 | 港外内とも被災あり、数量不明 41 - | | | | | | |
| | | 油油石 | | 工の数品 | | | | | | | |
| 35 | 數 | | | 石の飲品 | | | | | | | |
| 英 | | # | | 3,10散乱 | | | | | | | |
| | | | | 生の散乱 | NAME OF TAXABLE PARTY OF THE PARTY. | | | | | | |
| | | 27 | + | | | | | | | +の数線 45 | |
| * | 4 | 6 | 液 | 30 % | H 1/3=5.0 | Om(推定) | 47 3 | | | 1 2.0 sec | |
| | 自然条件 被 | | | 48 向 | ESE | | ** | 49 | | +41m | |
| | | 7 | | 株時間 | 不明6 | | - | | | 数 29.2m/ms | |
| | 53 旧方 | * | 12. 1 | | きさの変らない | | | | | 成後とし、その他 タを組合せた混成 | |

54. Kurei Harbor

- 1. Regional facility name
- 2. Kamata east breakwater
- 3. Construction method
- 4. Riprap sloping breakwater
- 5. Date completed
- 6. Unknown
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. The breakwater has a main body composed of continuous consolidation riprap. The head sector has a large cross section and concrete was used in the construction of the top. All of these parts were scattered or destroyed.
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Placed concrete in upper sections
- 20. (the head sector apron)
- 21. Riprap part
- 22. Foundation mound
- 23. Overlay
- 24. Consolidation blocks
- 25. Precast concrete armor units
- 26. Dissipation riprap
- 27. Other
- 38. 500 kg-1.0 t consolidation riprap
- 29. Design data
- 30. Wave height
- 31. Wave pressure
- 32. Breakers
- 33. Period
- 34. Angle of incidence
- 35. At time of damage
- 36. Amount of damage
- 37. Levee body slide
- 38. Levee body slope
- 39. Condition of levee body damage
- 40. Dispersion of overlay
- 41. Damage inside and outside harbor, amount unknown
- 42. Dispersion of foundation mound
- 43. Dispersion of consolidation blocks
- 44. Dispersion of dissipation works
- 45. Consolidation riprap (amount unknown) and upper concrete destroyed

- 46. Natural conditions
- 47. Estimated
- 48. Wave direction
- 49. Tidal level
- 50. Duration
- 51. Wind direction
- 52. Maximum 29.2 m/sec; peak 54.3 m/sec
- 53. Method of restoration
- 54. The breakwater head was made into a large levee body block composite breakwater since it is near the ship channel and exposed directly to waves; this was not changed much from the original condition; the consolidation stone was constructed as a composite breakwater combining placed concrete and blocks.

、商品量、各一色工程的整合企

-- W. ---

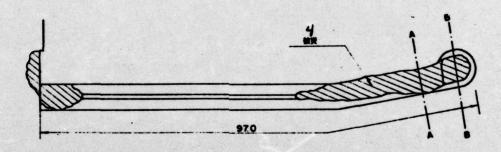
meilestaff work

. missif bus a tensoris massie

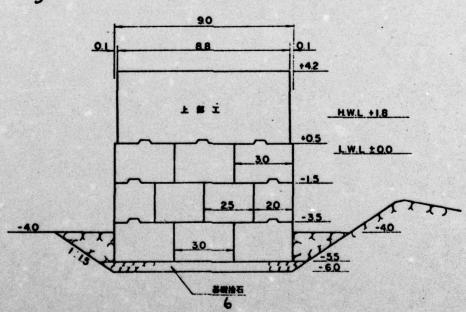
town! I shall Malasaub

被災箇所平面図

and incliffence leafuled with some of the beginning out the bill' terms you design and a standard of the contract of the sound of the contract of the contract



復旧新面図(B-B, 堤獺部)



54. Kurei Harbor

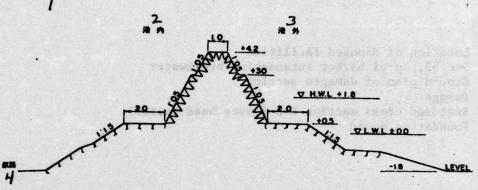
Key:

- 1. Location of damaged facilities
- 2. See 53, Kurei harbor Futanashima breakwater

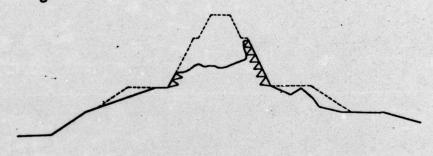
114

- 3. Ground plan of damaged section
- 4. Damage
- 5. Restored cross section B-B (levee head sector)
- 6. Foundation mound

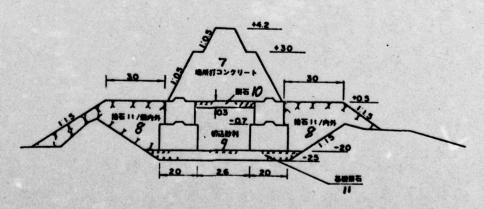
被災前断面図(A-A)



被災時断面図(A-A)



後日新南田(A-A)



| ey: or many are a fact and landers | 9 | | | | |
|--|---------------|-------|-----|------------|-----|
| . Cross section A-A prior to damage . Inner harbor . Outer harbor . Ship channel | | | | | |
| . Cross section A-A at time of damage . Restored cross section A-A | # W # | | | | |
| . In site concreting . 1 t riprap . Unscreened gravel | | | | | |
| Cobble stone Foundation mound | | | | a | |
| | | | | | |
| | | | | | |
| | | | | | |
| | 32.7 % | | | | |
| | | | | | |
| | · 65 / 5 | | | | |
| Q8 9 12 02 7-30) | | 35. | | | |
| The season of the season of | 35 45 16 | | | | |
| forms of the state | 是 特色 图 。 | | | | |
| \$6.4 °C | 4 4 4 | | | | |
| | 10 N 6 | | | | |
| A4.1 V | A N O E W | | | | |
| | 35 45 C T | | | 100 | |
| | 1.00 | | | | |
| | B. Was C. Co. | | 1 | | |
| the state of the s | | 推整 | | | |
| des martings will beneathers that the comme | <u> </u> | | 123 | La company | |
| marin pe a continue to a | 3 2 2 2 | | | | 100 |
| 10 milet 2 4 miles 20 20 20 20 20 20 20 20 20 20 20 20 20 | 2.3/ | 題 | | 機能 | |
| 12 12 12 12 12 12 12 12 12 12 12 12 12 1 | an an an | 14.32 | | | |

55 上の加江港

| 地区 | 施 | 段名 | 2釜ヶ | 建防波堤 | | | | | コン | クリート式混成堤 |
|--------|------|------|-------------|--------------------|--|---|--------------|-----|--------|---|
| 完成年 | 月日 | 6昭和 | 020年代 | | 被災年月日 | 昭和 4 5 年 8 | 月21 | B | | 9(台風10号) |
| 被 /0 规 | | 港夕 | | 石が散乱した。 // | egua | et of told | 19 41 | | | ans antro stantage tentage ment gent |
| | 冒 | | 14 | 寸 15 法 | ₼ 7.0 m | in section of the contract of | # 15 1004 | | 64 1 E | 1445 98 48 |
| | | 場用 | 14年 | コンクリはト | 不.明17 | | 888 | 191 | | |
| | 立 | 21 | 1-1 | 映 18 筋 | - | 8 | . An | 001 | | grannskation. |
| 被 | 都 | | | 中 19 結 | | | | | | |
| 12 | | 上部 | 場所打コ | ンクリュート | 1:3:6 | | | | | |
| | 24 抽 | ¥ 6 | 支差 石 | 不明 23 | | | | | | |
| 災 | 福 | 被 | 24 I | 不2男 | 不 2男 | | | | | |
| | 75 | 极固 | 33.1 | ts 126 | | | | | | 25 C 24 W 1 1 1 |
| | 邮 | 俏波 | 至9 - 1 | te L 26 | | | | | | |
| 的 | | mi | 多 石 | t L 26 | | | | | | |
| | t | 0 | Ats 29 | 着外内とも。 | 根固石 2.0 t/ | 個 30 | | | | |
| | 10: | 31 | * | 被 32 高 | 不明23 | 3 | 改 | 33 | Æ | 不明23 |
| | | | | 周 34 期 | 1 2 sec | | 入35 | 射 | 角 | β = 20° |
| | 37 | - | | 38+ ~ 1 | ts 126 | | | | | |
| | * | 立 | 堤 体 | 30 桶 料 | # L 26 | | • | | | |
| 被 | 災 | 部 | 提体 | 被握 の状況 | ts 1 26 | | | | | |
| | | 21 | 被极 | 工の数乱 | - | | | | | |
| 36 | 數 | 石 | * # | 石の散乱 | 7 | | | | | |
| 类 | 2 | 部 | | 43,00散乱 | - | | | | | 2 S P 10 - 10 K |
| | | | | 生物 散 乱 | | | | | | |
| | | 29 | * | の 他 | 根因石, 差外, 延長110.0m 約2,000m 港内, 延長155.0m 500 | | | | | |
| 時 | 4 | 46 故 | | 32 B | | .Om(推定) | 周 | 34 | 期 | 1 2 sec |
| | | | | 48 向 | ESE | | 棚 | 49 | 故 | +4.1 m |
| | | | 50種 | 統時間 | 不明23 | | 風 | 5/ | * | 於大 29.2m/sec 5 的於 54.3m/sec 5 |
| 概 : | 53日方 | Ħ | | 側は被災箇所を 側は散乱した在 | 石を集め天端 | | | | | ・クにて消波工とし。 ^と 。 |

55. Kaminogae Harbor

- 1. Regional facility name
- 2. Kamagakubo breakwater
- 3. Construction method
- 4. Placed concrete composite breakwater
- 5. Date completed
- 6. In the 1930's
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. Consolidation stone inside and outside harbor was scattered.
- 12. Prior to damage
- 13. Vertical part
- 14. Placed concrete
- 15. Dimensions
- 16. Concrete
- 17. Unknown
- 18. Reinforcing steel
- 19. Fill
- 20. Upper concreting in site
- 21. Riprap part
- 22. Foundation mound
- 23. Unknown
- 24. Overlay
- 25. Consolidation blocks
- 26. None
- 27. Precast concrete armor units
- 28. Dissipation riprap
- 29. Other
- 30. 2.0 t consolidation stone inside and outside harbor
- 31. Design data
- 32. Wave height
- 33. Wave pressure
- 34. Period
- 35. Angle of incidence
- 36. At time of damage
- 37. Amount of damage
- 38. Levee body slide
- 39. Levee body slope
- 40. Condition of levee body damage
- 41. Dispersion of overlay
- 42. Dispersion of foundation mound
- 43. Dispersion of consolidation blocks
- 44. Dispersion of dissipation works
- 45. 110.0 m extension about 2000 m³ consolidation stone outside harbor; 155.0 m extension of 500 m³ inside

- 46. Natural conditions
- 47. Estimated
- 48. Wave direction
- 49. Tidal level
- 50. Duration
- 51. Wind velocity
- 52. Maximum 29.2 m/sec; peak 54.3 m/sec
- 53. Method of restoration
- 54. Damaged sectors on outer harbor side were not restored but made into dissipation works by placing 20.0 t hollow triangular blocks on top; scattered stone on the inner side was brought together, the top width increased, and overlay stone restored.

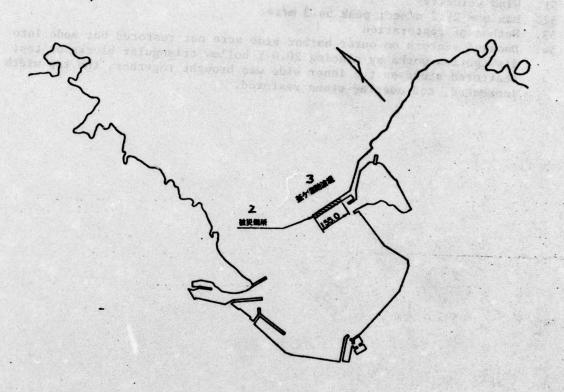
员道宫旅游加速

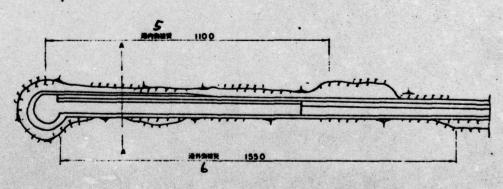
和新型品模型用

to provide the stranger Total Later

Pri lance data

被災施設位置図





155. Kaminogae Harbor

《其一者》副發展官方題。

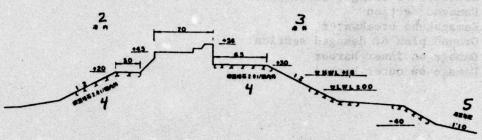
· 多水一人子切高领面工芸。

FA-A 7 的函数函数

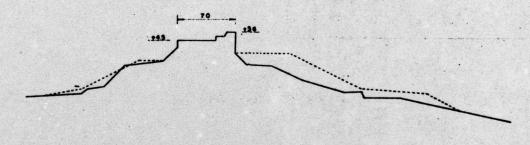
- 1. Location of damaged facilities
- 2. Damaged section
- Kamagakubo breakwater
 Ground plan of damaged section
- 5. Damage on inner harbor
- 6. Damage on outer harbor

多上の加工港

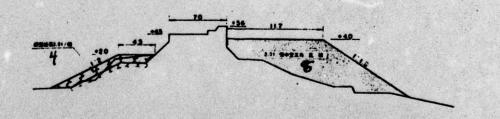
後災前断面図(A-A) /



後災時断面図(A-A)



復旧新画図(A-A) 7



化安全分分部 以自身,对某一种公司是

BAR-SUA

都所於放弃及 李 雅 然 也 地

14年 在 股

种性情格

2

-

· 大大型 南县

经报价品的 枝 经 玩声 数 技

新一种业务 诗

造成数据

Key: This will have the search as purely

- Cross section A-A prior to damage 1.
- Inner harbor
- 3. Outer harbor
- Consolidation riprap about 2.0 t/piece

MARINE NO SECTION

- Ocean floor pitch
- Cross section A-A at time of damage
- Restored cross section A-A
- Hollow triangular random rubble

6 下 田 港

| /地(| 区施 | 段名 | 2巻 [| 3 游 旅 提 | | 3構造 | 様式 4拾プ | 0 7 5 | 7式傾斜堤 | |
|-----|----------|------------|------------|---------------------------|--|--------------------|---------|-------|------------------------------|--|
| 完成年 | 被 /0 災 状 | | 04 0年 | | 被災年月日 | 加斯45年8 | 月21日 | | 9(台風10号) | |
| 1 | | | | | のうち先端倒780mは160t/個 テトラポッド。残りは80tがいずれも高放によって除役または散乱した。 | | | | | |
| | | | | 寸 15 株 | - | | | | rit er sans | |
| | 13 | 75 | 14 | コングメート | - | 77.98 | in de | 9 8 | tas y field that | |
| | | " | | 鉄 17 筋 | _ | | | | | |
| 被 | 都 | | | 中 18 糖 | | | | | | |
| | | 五郎 | 場所打コ | ンクリート | - | | | | • • • • • • • • • | |
| 12 | 捨 | # 8 | 清 石 | 15,4L | | | | | | |
| 炎 | 20a | 被21 | Ø I | tepy L | - | | | | | |
| | 石 | 根固でピック なりし | | | | | | | | |
| | 郵 | 前波をラック | | 8.0 t/値、又は 16.0 t/値テトラポッド | | | | | | |
| 前 | | | 多维 石 | | | | | | | |
| | | 64 0 他 | | TEMPL | | | T | | | |
| | R | 27 | # | 故 28 萬 | | .8 m | # 29 | E | 不明30 | |
| | | | | 周 3/ 期 | | | 人32射 | 7 | β= 30° | |
| | 被 | 惠墨 | | 035 ~ 1 | | | | | | |
| | | | | 360 領 斜 表型の状況 | + ′′- | | | | | |
| 被 | 发 34 | | | In the state | | | | | | |
| 33 | 数 | 20a | | 530 th 8. | | | | | | |
| 炎 | | 石 | 40 m - | | | | | | | |
| | | | 商数 | Ju/0 数 乱 | W21601/1 | テトラポッド, 国ナトラポッド | 延長80.0= | , 6 | 28個 | |
| | | 26 | | D 他 | | | | | | |
| 14 | , | 12 | 故 | 29 高 | H 1/3 = 5 | .0m(推定) | m 3/ | M | 1 2 mc | |
| | | 43 故 | | 45 向 | SE | | m 46 | 做 | | |
| | | | | 被斗为 阳 | 不明 | 30 | E 48 | * | 股大 35.8m/sec 時級 46.8m/sec | |
| 復 1 | n 5 | ŧ | RINE: S | QIB O | | | | | | |

- 1. Regional facility name
- 2. Harbor mouth training levee
- 3. Construction method
- 4. Riprap block sloping breakwater
- 5. Date completed
- 6. 1965
- 7. Date damaged
- 8. 21 Aug. 1970
- 9. Typhoon No. 10
- 10. Damage status
- 11. 78.0 m on the top side, out of 158.0 m of the length of the damaged sector, had 16.0 t tetrapods, the rest 8.0 t tetrapods; these all caved in or were scattered by high waves.
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. Foundation mound
- 20a. Riprap part
- 21. Overlay
- 22. Consolidation blocks
- 23. Precast concrete armor units
- 24. 8.0 t or 16.0 t tetrapods
- 25. Dissipation riprap
- 26. Other
- 27. Design data
- 28. Wave height
- 29. Wave pressure
- 30. Unknown
- 31. Period
- 32. Angle of incidence
- 33. At time of damage
- 34. Amount of damage
- 35. Levee body slide
- 36. Levee body slope
- 37. Condition of levee body damage
- 38. Dispersion of overlay
- 39. Dispersion of foundation mound
- 40. Dispersion of consolidation blocks
- 41. Dispersion of dissipation works
- 42. 628 8.0 t tetrapods extended 80.0 m; 799 16.0 t tetrapods extended 78.0 m
- 43. Natural conditions
- 44. Estimated
- 45. Wave direction

46. Tidal level

N TORA

The Marie of the

Jan D. Amarita Kallin

- 47. Duration
- 48. Wind velocity: Maximum 35.8 m/sec; peak 46.8 m/sec
- 49. Method of restoration
- 50. Restored to original condition

* As bregain

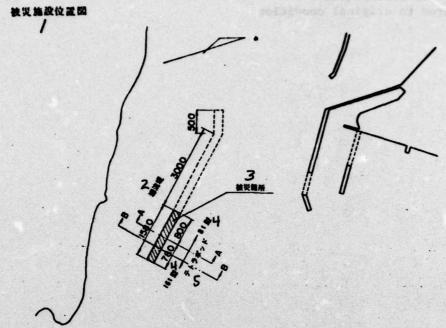
推注上第3.20 第64.20元之

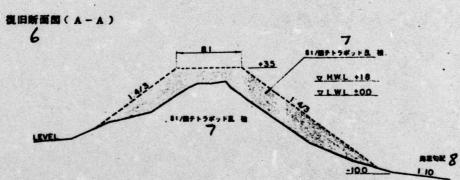
-- £05 --

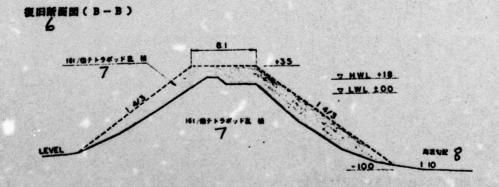
With the America

CA-ALLER HILLS

(日一日:100 西田東







56. Shimoda Harbor

Key: 2 4 7 6 Location of damaged facilities 1. Training levee on white the real of the back to be be been as a few party of the back to be a fe 2. 3. Damaged section Type tetrapods 4. 5. Type tetrapods 6. Cross section A-A restored 7. Tetrapod random rubble 8. Ocean floor pitch /一年末大江(日本) With the Man Marian arter CIL WEST SCHOOL SONT A B STEEL M. W. 26 \$72 ps. 30 腹水 25 WT 海 W · Ville 物质类的 版 号 经营业的证价的证券 医多种性皮肤 医阿拉耳氏试验检尿病 医多种性神经病 化二苯甲基 。在20年間在晚点 第 2 2 通

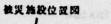
切 唐 津 港

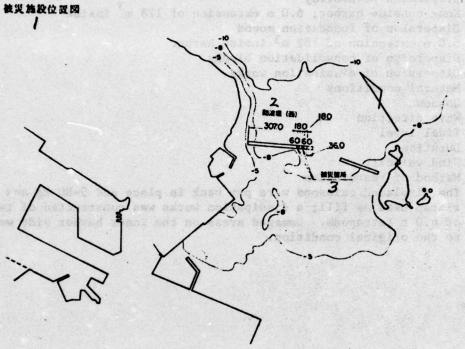
| | 区 施 | | | 地区防放堤 | <u> </u> | | 试 45- | 77 | | | |
|-------------|--------|--------------------------------|-------|---------------|--------------------------|----------------|-------------------|----|------|--------------|---|
| 完成 年 | 月日 | 施二 | T + 6 | | V被災年月日 8 | 昭和 4 3 年 2 | 月15日 | | 90 | 低気圧 | |
| 被状状 | り記 | | | | あったが先端か んで傾斜しとか | | | | | | 8 |
| | ā | | | 寸 /5 法 | | | | | | | |
| | 13 | 1 | 14, | コンクリート | - 14 - 1 | | | | | | |
| | * | | | 執 19 筋 | 7 9.0 kg/m² | SD30 | | | | | _ |
| 被 | 報 | | | 中 20 站 | + | | | | | | |
| 12 | 1. | | - | メクリート | | ント使用量 2: 23 | 5 0 kg/m² |) | | | |
| 英 拾 24 石 | 拾 | 35 | | 5~8 0kg/@ 26 | | | | | | | |
| | 24 | 被27億 工 港外内とも、 | | | 指右 \$ 0 0 kg/1 | 個および500k | 28 | | | | |
| | 4 | | 至9,0 | t 130 | | | | | | | |
| | 都 | CHARLEST CONTRACTOR CONTRACTOR | | t 130 | | | | | | | |
| | 222 | | - | * 130 | t L30 | | | | | | |
| | عرو | 3七 の 他・ | | 故 35 高 | H 1/3=2.3 | | 故 36 | Æ | #A-1 | A放 37 | |
| | 34 R | 計算 | i #i | 周 38 期 | 9.5 sec | | 入39射 | A | β= 1 | | _ |
| | | # 42 # | | ö ナ ベ り | 1 1.0 m * 1 | 614.0m | 2番44 | | | | |
| | 被 | 京の部 | | 450 横斜 | 104°~10 | | | | | | |
| | 41 | | 提体 | が強の状況 | # L30 | | | | | | |
| 被 | 炎 | 24 | 被极 | 470 数 乱 | | 48 港内,到 | E長 6.0 m, | 12 | 8 18 | | |
| 40 | 數 | 24 | | | * @ | #90 数 乱 | 港內,延長6.0m,183㎡ 50 | | | | |
| 炎 | | 石部 | 根固プ | 5,00散乱 | - | | | | | | |
| | | ap | 消波 | 158 M A | - | | | | | | |
| | | 33 | + | o file | | | | | | | |
| 時 | | 自然条件 技 | | 35 🛎 | 不明 5 | 4 | 周 38 | 期 | 不! | A 54 | |
| | | | | 55 向 | | 7 | # 56 | 位 | 不! | H 54 | |
| | | | | 称57時間 | | 54 | R 58 | | | -30 m/s | _ |
| 復 1 | 59 月 方 | 技 | Fr. | | 据え直し港外側 トラポッド2階 60 | | | | | | |

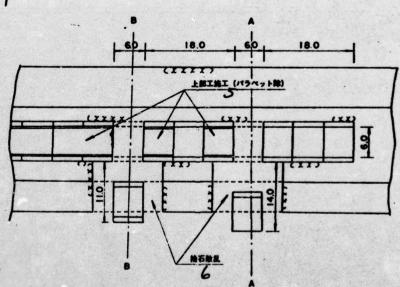
57. Karatsu Harbor

- 1. Regional facility name
- 2. East harbor sector breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Being constructed
- 7. Date damaged
- 8. 15 Feb. 1968
- 9. Low pressure
- 10. Damage status
- 11. The unfinished superstructure was damaged but only the 4th and 8th caissons came out from the cusp and were displaced, tilting on the sloping surface of the mound; the overlay stone and foundation mound were scattered because of this.
- 12. Prior damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Sidewall 0.3, compartment wall 0.2, base plate 0.5
- 17. Concrete
- 18. Cement used 330 kg/m³
- 19. Reinforcing steel
- 20. Fill
- 21. Sand. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. Unfinished (cement used 250 kg/m³)
- 24. Riprap part
- 25. Foundation mound
- 26. 5-80 kg/piece
- 27. Overlay
- 28. 300 kg and 500 kg riprap inside and outside harbor
- 29. Consolidation blocks
- 30. None
- 31. Precast concrete armor units
- 32. Dissipation works
- 33. Other
- 34. Design data
- 35. Wave height
- 36. Wave pressure
- 37. Partial breakers
- 38. Period
- 39. Angle of incidence
- 40. At time of damage
- 41. Amount of damage
- 42. Levee body slide
- 43. 11.0 m and 14.0 m
- 44. Two caissons

- 45. Levee body slope
- 46. Condition of levee body damage
- 47. Dispersion of overlay
- 48. None outside harbor; 6.0 m extension of 128 m³ inside
- 49. Dispersion of foundation mound
- 50. 6.0 m extension of 183 m3 inside harbor
- 51. Dispersion of consolidation blocks
- 52. Dispersion of dissipation works
- 53. Natural conditions
- 54. Unknown
- 55. Wave direction
- 56. Tidal level
- 57. Duration
- 58. Wind velocity
- 59. Method of restoration
- 60. The displaced caissons were put back in place and 5-80 kg and 300 kg riprap used as fill; a dissipation works was constructed of two layers of 4.0 t tetrapods. Damaged areas on the inner harbor side were restored to the original condition.





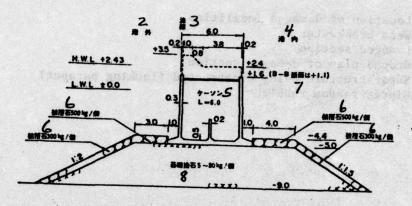


7. Karatsu Harbor

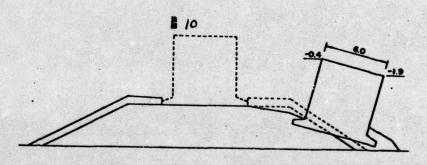
(人一)。) 自绕物质观察

- 1. Location of damaged facilities
- 2. West breakwater
- 3. Damaged section
- 4. Ground plan of damaged section
- 5. Superstructure being constructed (lacking parapet)
- 6. Riprap random rubble

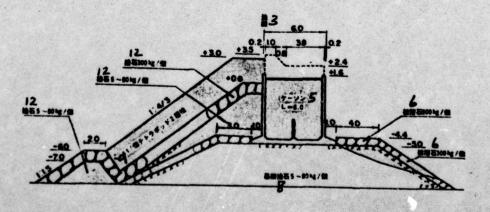
被災前断面図(A-A)



後災時斯面図(A-A) 9



復旧新面図(A-A) //



11年表了新一条。至8

THE REAL PROPERTY.

15

传递运动

如果都在10°多年报 中国人

Key:

- Cross section A-A prior to damage 1.
- 2. Outer harbor
- 3. Normal
- Inner harbor 4.
- 5. Caisson
- 6. Overlay
- (B-B cross section +1.1) 7.
- 8. Foundation mound
- 9. Cross section A-A at time of damage

智慧 图 本 图 36 图

- 10. Normal
- 11. Restored cross section A-A
- 12. Riprap

1、現在 1年 2 年 1 日 八 日 日

編章 一生 ... 水野で カス田将さるヨリ、海ボ、マ ボ、ドロリロイを経典が作 200mg A

| 完成年 | 年月日 | 不 | 明6 | | 7被炎年月日 日昭和 4 5年8 | 月14日 | | 9(台風9号) | | |
|--------|------------|--|----------|-----------------------|--------------------------------|------------|------------|---------------|--|--|
| 被状 | /0 规 | | | が多少移動しっ に洗下した。 | ウンド拾石の中に沈下傾斜し // | た。また根因 | ブロッ | クもその場所で | | |
| | | | | 寸 15 性 | B H L 部材用 | 不明 化 | | recomban | | |
| | 13 | 14, | | コンシリート | σ ₂₆ = 2 4 0 kg/cml | (1.1+ m) | 3044 | | | |
| | 立 | | | 典 18 筋 | 18.1 kg/m² | | (percent | (fix) dishaso | | |
| 被 | # | | | 中 /9 路 | 中 /9 站 袋詰コンクリート 単位体積重量 不 | | | | | |
| 12 | | 上部場所打予ンクリート | | レクリート | e ₃₀ = 2 4 0 kg/cm | | | | | |
| | | * 8 | 14 石 | 5 0 0 kg/個 | 25 | | | | | |
| 炎 拾 23 | | ₩ ²⁶ @ I | | mp | | | | | | |
| | 石 | Button d | 90,1 | 着外。1.5× | H L 1.0×不明 | | | | | |
| | # | 精設プロック な し27 | | | | The second | | | | |
| 前 | | | P抽 石 | t L27 | | | | | | |
| | 31 + | 0 | t . | · * L27 | | | | | | |
| | 32 R | 21 9 | # | 被 33 高 | H 1/3 = 2.5 m | | | t 複数 35 | | |
| | | • | | 周 36 期 | 7 sec | 入37 射 | A 7 | F 男 38 | | |
| | | 1 13 | | o ⁴¹ ; < 9 | | | | | | |
| | 40 | #5 | 提件 | 4% 領 朝 | | | | | | |
| Ħ | 英 | | 提体 | 野田の状況 野の歌 乱 | | | | | | |
| 39 | 数 | | * | 被概 | # E | | | | | |
| -1 | | 23石 | 1 A | さらの散乱 | | | | | | |
| 英 | - | * | | | | | | | | |
| | | CONTROL OF THE PROPERTY OF THE | | | 480 散 乱 — | | | | | |
| | | 121 | 3/ t o m | | H 1/3=4.5 m (BM) | m 36 | m z | w 38 | | |
| | | 49 故 | | 33 × | SSE | M 52 | - | 3.4m | | |
| | EIR | | 故 | #534 NO | 不明 36 | E 54 | | A SESSON | | |
| | | | | | よび機固プロックは後旧せず | | | | | |
| ** | 56 B # | # | kg/ | 自捨石を中誌と | した801/個テトラポット | による前波工 | | | | |

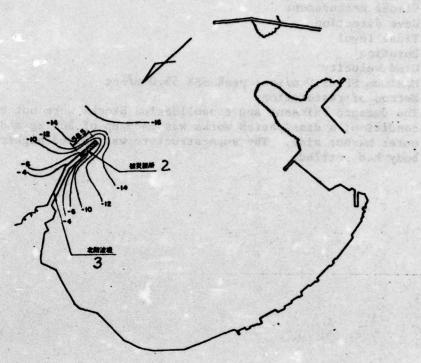
58. Wakizaki Harbor

- 1. Regional facility name
- 2. North breakwater
- 3. Construction method
- 4. Caisson composite breakwater
- 5. Date completed
- 6. Unknown
- 7. Date damaged
- 8. 14 Aug. 1970
- 9. Typhoon no. 9
- 10. Damage status
- 11. Levee body caissons were displaced somewhat, sinking in the mound riprap and tilting. Consolidation blocks also settled into the middle of the mound at this place.
- 12. Prior to damage
- 13. Vertical part
- 14. Caissons
- 15. Dimensions
- 16. Member thickness unknown
- 17. Concrete
- 18. Reinforcing steel
- 19. Fill
- 20. Bagged concrete
- 21. Unit volume weight unknown
- 22. Upper concreting in site
- 23. Riprap part
- 24. Foundation mound
- 25. 500 kg/piece
- 26. Overlay
- 27. None
- 28. Consolidation blocks (outside harbor, L unknown)
- 29. Precast concrete armor units
- 30. Dissipation works
- 31. Other
- 32. Design data
- 33. Wave height
- 34. Wave pressure
- 35. Clapotis
- 36. Period
- 37. Angle of incidence
- 38. Unknown
- 39. At time of damage
- 40. Amount of damage
- 41. Levee body slide
- 42. Levee body slope
- 43. Condition of levee body damage
- 44. Dispersion of overlay
- 45. Dispersion of foundation mound

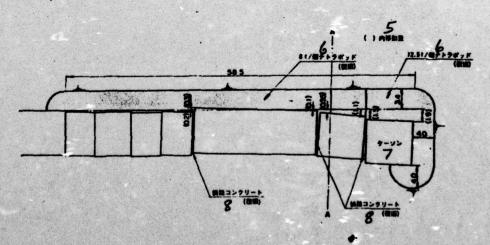
- 46. Dispersion of consolidation blocks
- 47. Only sinking
- 48. Dispersion of dissipation works
- 49. Natural conditions
- 50. Visual measurement
- 51. Wave direction
- 52. Tidal level
- 53. Duration
- 54. Wind velocity
- 55. Maximum SE 39.0 m/sec; peak SSE 55.0 m/sec
- 56. Method of restoration
- 57. The damaged caissons and consolidation blocks were not restored to original condition; a dissipation works was made up of 200 kg and 500 kg riprap on outer harbor side. The superstructure was raised higher since the levee body had settled.

whose weighter the do make the con-

被災路股位置因



被災館所平面図 イ



58. Wakizaki Harbor

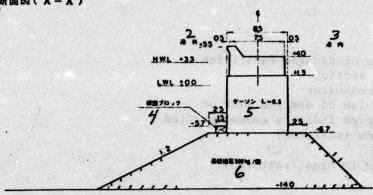
Key:

- Location of damaged facilities
 Damaged section
- 3. North breakwater
- 4. Ground plan of damaged section
- 5. Parentheses indicate amount shifted

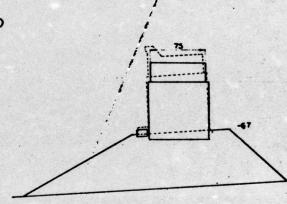
.7.

- 6. Tetrapods (restored)
- 7. Caisson
- 8. Concrete in bags (restored)

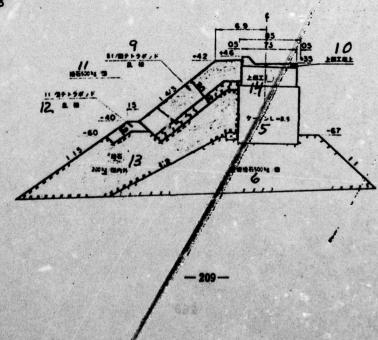
被災前断面図(A-A)



後災時断面図(A-A) フ



復旧新面図(A-A)



58. Wakizaki Harbor

We Sharkfred The Art

五 京 田 田 村

- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. Inner harbor
- 4. Consolidation blocks
- 5. Caisson
- 6. Foundation mound
- 7. Cross section A-A at time of damage
- 8. Restored cross section A-A

MATTER SER

鲁宁 神 米

- 9. Tetrapod random rubble
- 10. Raised superstructure
- 11. Riprap
- 12. Tetrapod random rubble
- 13. Riprap about 200 kg
- 14. Superstructure

4.0.3

超11年9、出身之大人致趣

(MA) WOLLDAN

\$860 ml

| 地 | 区施 | 段名 | 2南湖 | 流堤 | 3構造 | は様式 4指プロッ | 0式傾斜堤 | | | |
|----|-------|------------|--------|------------------------|-----------------------|---------------------|------------------|--|--|--|
| 完成 | 年月日 | る昭和 | 145年3 | 月31日 | 被災年月日 8 昭和 4 6年 | 8月30日 | . 9(台版23号) | | | |
| 被状 | 10 规 | | | 水による洗掘と m程沈下した。 | 放にょりテトラポッドによ // | る傾斜堤全延長 4 | 5.1mが基礎地盤洗 | | | |
| | 直 | | | 寸 15 法 | - | in the second | a tali | | | |
| | 13 | | | コンクルート | aprate 16 or | da na v Asa. | into par acco | | | |
| | 立 | " | 14 | 鉄 17 筋 | | ofener mo | Bright Bodye 219 | | | |
| 被 | 邮 | | | 中 18 路 | | 80 35.013 | | | | |
| 12 | | 2年 | 場所打コ | ンクリート | - | murius au | inter Germanie | | | |
| | | X 0 | 7 1 石 | te 114 | | | allan rasi seni | | | |
| 英 | 20 | 被22 | a I | 2 4 14 | | | | | | |
| | 石 | | 30,1 | z 14 | | | | | | |
| | 部 | 稍被外。力 | | 1 2.5 t/個テトラポッド。 乱検 25 | | | | | | |
| M | | M 8 | 抽 石 | * 14 | | | | | | |
| | 27+ | _0 | lits . | 2 14 | | | | | | |
| | 200 | 21 3 | : 151 | 故 29 高 | H 1/3 = 4.5 m | 被 30 E | 砕故 3/. | | | |
| | | | | 周 32 期 | 1 4.0 sec | 入33射角 | β = 28° | | | |
| | | 温 | 提体 | で ナベ り | | | | | | |
| | 35 | 立 | 提 体 | の傾斜 | - | | | | | |
| 被 | 英 | # # F | | 数据の状況 | 7 | | O PO IN | | | |
| 34 | 數 | 20 抽 | | 「の散乱 | - | | | | | |
| | * | 石 | - | 石の散乱 | - | | | | | |
| 炎 | - | 都 | | ロックの教乱 | | | | | | |
| | - | - | | | 延長168.0m, 911個 | 43 | | | | |
| | - | 27 | | O ft | | T- 00 F | | | | |
| 時 | 4 | 4_ | 被 | 29 # | H 1/3=4.0m(目測) SSE | 周 32 期 | | | | |
| | 自然 | 自然条件 被 | | 粉 向 | 不明48 | ₩ 47 位 ■ 50 速 | | | | |
| | 1 | | | | るので原形復旧とした。 | J 30 18 | 10.011/100 | | | |
| 復 | 5/ 旧方 | 技 | 00.48 | 5 | 2. | | | | | |

```
Key:
      Regional facility name
      South training levee
      Construction method
  4. Riprap block sloping breakwater
      Date completed
      31 Mar. 1970
     Date damaged
     30 Aug. 1971
     Typhoon No. 23
 10 Damage status
 11,
      The foundation basin was washed out along a total 215.1 m extension of
     the levee by flood waters from the Goyase river and by waves, and the
     tetrapods sank down 1.5 m.
 12 Prior to damage
13 Vertical part
 14 None
 15. Dimensions
 16: - Concrete
 17, Reinforcing steel
18. Fill
 19. Upper concreting in site
 20 Riprap part
21 Foundation mound
 22.
     Overlay
    "Consolidation blocks
 231
 24 Precast concrete armor units
     12.5 t tetrapods, random rubble
 26 Dissipation works
 27 Other
28 Design data
29 Wave height
 30 . Wave pressure
 31 | Breakers
 32 Period
 334 Angle of incidence
 34. At time of damage
 35. Amount of damage
 36.1 Levee body slide
 37. Levee body slope
. 38. Condition of levee body damage
 39. Dispersion of overlay
40. Dispersion of foundation mound
 41. Dispersion of consolidation blocks
 42. Dispersion of dissipation works
 43. 911 extended 168.0 m
 44. Natural conditions
     Visual measurement
```

i) Q.

- 46. Wave direction
- 47. Tidal level
- 48. Unknown
- 49. Duration
- 50. Wind velocity
- 51. Method of restoration
- 52. Restored to original condition because of subsidence from erosion by scouring.

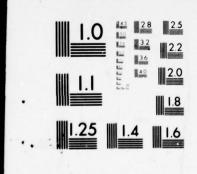
拉斯斯斯斯史斯

《本中本》和1000年初時

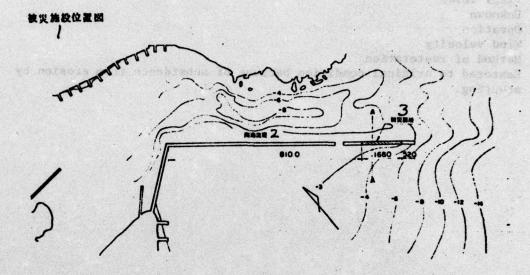
~ 112 -

PORT AND HARBOUR RESEARCH INST TOKYO (JAPAN)
DISASTERS OF BREAKWATERS BY HE ACTION (2).(U) AD-A036 006 F/G 13/2 MAR 75 H TAKEYAMA, T NALAYA.4A TN-200 UNCLASSIFIED ACSI-K6472 NL 6 of 6 AD 36006 100

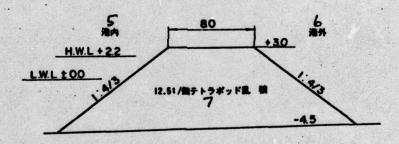
6 OF 6 AD 36006



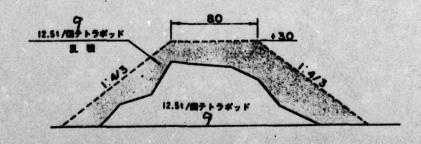
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963



装貨前新面図(A-A) イ



後日新華間(A-A)



Figu

59. Nobeoka Harbor BEERGARANA CHARACTER 一 经企業事業主任的過程日長等促进者 Key: Location of damaged facilities South training levee Damaged section Cross section A-A prior to damage Inner harbor Outer harbor Tetrapod random rubble Cross section A-A restored Tetrapod random rubble 5月後,海水池大工工程以中华人士公司管理等 HE SHOW THE 烈 位 黎 a se of the 近形·依徽 基 其 w ages. Vas west t 五路後 Fanda ·· Salina M OF M TO THE 当一克克 施 北京汽车 有多透标 **观**然或言学员 THE T 就 格泽特 龍 1% 为产品 AND THE PART THE PROPERTY. 黄金纵布

--- 212 ---

[manual]

| 地 | 区施 | 段名 | 2中 4 | · 流堤 | 3構造株式 4拾プロック式機料堤 | | | | | |
|-----|------|----------|--|--------------------------|--|----------------|----------------|--|--|--|
| 完成年 | 年月日. | 6昭和 | 146年3 | 月31日 | 7被炎年月日 8昭和 4 6年 | 8月5日 | 9(台展19号) | | | |
| 被状 | 10 | | 川の出水・洗掘を受 | (4552t/s け 1.5 m 程沈7 | ioc)と彼によりテトラポッドによる傾斜堤先端:10.0mが基礎が 下した。 // | | | | | |
| | | | | 寸 15 株 | _ 3450KB 65 0 | a water Arthur | e est see se | | | |
| | 13 | te | 14 L | コンルリート | - " | | designation | | | |
| | 立 | | | 映 17 新 | - | | | | | |
| 被 | 都 | | | | | | | | | |
| 12 | | | | ンクリート |] - | | | | | |
| | _ | Decolor: | 7% B | * 14 | | | | | | |
| 災 | 20 | *21 | | * 14 | | | | | | |
| | 石 | | 30,0 | 12 L/4 | | | | | | |
| | - | 構設プロック | | 8.0 t/個テトラポッド,乱機 | | | | | | |
| 10 | | m | 前波接石 なし14 | | | | | | | |
| | 25+ | 0 | ft · | 2 14 | | | | | | |
| | 26 R | # 3 | # # | 数 27 萬 | H 1/3=4.3 m | # 28 E | 养 数 29 | | | |
| | | | | m 30 m | | 入3/ 計 为 | β=45° | | | |
| | 33 | 13 | 提供 | 6+ ~ 0 | The state of the s | - (*x) (*) | | | | |
| | * | 20 | 提 作 | 0 概 解 | 4 - | | | | | |
| 被 | 类 | | 提 体 | 教養の状況 | | | | | | |
| 32 | | | CONTACTOR OF THE PARTY OF THE P | IONE | | | | | | |
| | | 石 | The same of the sa | 石の散脈 | - | | | | | |
| 爽 | = | | | - , / 负数数 | | | | | | |
| | | | | | 延長110.0m, 762個 | 41 | | | | |
| | - | 25 | 10.5-20 Lance | o 16 | - · · · · · · · | I | | | | |
| - | 4 | 42 | | 27 🛎 | H 1/3=4.0m(見覧) | m 30 m | 14mm +3.6 m | | | |
| | 自然 | 条件 | | 44 向 | SE 不 947 | 期 45 位 | +3.6 m | | | |
| | L | | | 就省時 閲 | | ■ 48 ≥ | 20.5 m/ax | | | |
| | 49 | £ | 元雅 | C 2 5 A T 3 3 5 | をなって東形像旧した。 「O | | | | | |

60. Miyazaki Harbor

- 1. Regional facility name
- 2. Middle training levee
- 3. Construction method
- 4. Riprap block sloping breakwater
- 5. Date completed
- 6. 31 Mar. 1971
- 7. Date damaged
- 8. 5 Aug. 1971
- 9. Typhoon No. 19
- 10. Damage status
- 11. The foundation basin overlain by tetrapods on 110.0 m of the top of the levee washed out because of flooding of the Oyodo river (4552 t/sec) and waves; it subsided about 1.5 m.
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. Riprap part
- 20a. Foundation mound
- 21. Overlay
- 22. Consolidation blocks
- 23. Precast concrete armor units
- 24. 8.0 t tetrapods, random rubble
- 25. Dissipation works
- 26. Design data
- 27. Wave height
- 28. Wave pressure
- 29. Breakers
- 30. Period
- 31. Angle of incidence
- 32. At time of damage
- 33. Amount of damage
- 34. Levee body slide
- 35. Levee body slope
- 36. Condition of levee body damage
- 37. Dispersion of overlay
- 38. Dispersion of foundation mound
- 39. Dispersion of consolidation blocks
- 40. Dispersion of dissipation works
- 41. 762 extended 110.0 m
- 42. Natural conditions
- 43. Visual measurement
- 44. Wave direction

- 45. Tidal level
- 46. Duration
- 47. Unknown
- 48. Wind velocity
- 49. Method of restoration
- 50. Restored to original condition because of serious extent of subsidence by erosion from scouring.

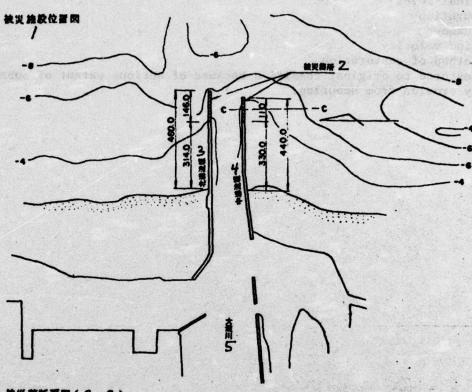
医 生物 等 他

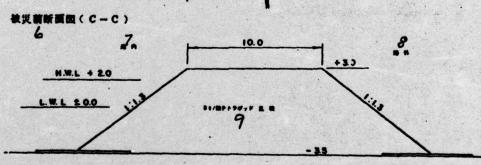
- 游戏游戏游戏英

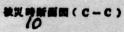
as a arm

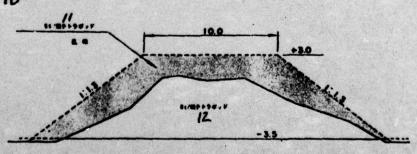
CO-5; makeun

10年間から









60. Miyazaki Harbor

Key: 1. Location of damaged facilities 2. Damaged section 3. North training levee 4. Middle training levee 5. Oyodo River 6. Cross section C-C prior to damage 7. Inner harbor 8. Outer harbor 9. Tetrapod random rubble 10. Cross section C-C at time of damage 11. Tetrapods

Some and the second sec

@ 官 崎 港

| /地区施設名 2北湖 | | | | 序流 提 B構造様式 | | | | 4拾ブロック式傾斜堤 | | | |
|------------|------------|-----|-------------------------------|-------------------------------------|--|----------|--------|------------|--------------|--|--|
| 完成年 | 手月日 | 6昭和 | 044年3 | 月31日 | 7被災年月日 8昭和46年8 | 月5日 | 8 | | 9(台風19号 | | |
| 被从 | 数ル数 | | 別の出力 | k(4552t) Iを受け 1.5 m ³ | ∕sec)と彼により、テトラポッ B度沈下した。// | rĸ. | よる傾 | 斜堤5 | た端146.0 m が基 | | |
| | I . | | | 7 15 th | T | L. Salar | | | | | |
| | 13 | | 4. | コングガート | _ | | | | | | |
| | 立 | 左 | | 映 17 筋 | | e i zie | 1925 3 | ot. | | | |
| 被 | 郵 | | | ф 18 th | ogenes to one | 38 | | | | | |
| 12 | | 涅事 | 場所打= | ンクリート | | | | | | | |
| | | 3 R | 抽 石 | te 14 | | | | | | | |
| 类 | # 20 石 | #22 | a I | te 114 | | | | | | | |
| | | 模問 | 温., | te 1.14 | | | | | | | |
| | | 州故: | 40.1 | 5.0 t/個および8.0 t/個テトラポッド。乱積 | | | | | | | |
| M · | | m 3 | 抽 石 | te 114 | | | | | | | |
| | 264 | 0 1 | | te 1.14 | | | | | | | |
| | 27 - | 計集 | •4 | # 28 m | $H_{1/3}=4.0 \text{ m}(5.0 \text{ t})4.3 \text{ m}(8.0 \text{ t})$ | 被 | 29 | Æ | 砕被30 | | |
| | -1 - | | | 周 3/ 期 | 1 4 sec | 13 | 2射 | A | 4 5° | | |
| | 34 | 13 | 提体 | 6 ナベ り | | | | | | | |
| | * | 文 | 提供 | OH | | | | | | | |
| * | 英 | | 提体 | 数数の状況 | | | | | | | |
| 33 | | 20 | 被权 | 子の数裁 | ·- | | | | | | |
| ,, | N | 石 | and the state of the state of | 名の数数 | | | | | | | |
| 类 | | | | 2,10散乱 | | -45 | ر | | | | |
| | | | CHAIL CONTRACTOR | 上の散乱 | 5.0 1/個テトラポッド1 | 5 3 6 | F 8. (| 1/ | 個テトラポッド782 | | |
| | | 26 | ŧ . | | | _ | | | | | |
| * | 4: | 43 | | 28 🛎 | H 1/3=4.0 m (B M) | - | 31 | M | 1 4 sec | | |
| | 自然 | 条件 | 故 | 45 向 | SE | - | 46 | - | + 3.6 m | | |
| | | | | 8247時 180 | 本 明 48 | - | 49 | * | 2 0.5 m/sec | | |
| | 50 B 75 | # | 赤雅 | による优下が当 | というので原形復旧とした。 5/ | | | | | | |

- 1. Regional facility name
- 2. North training levee
- 3. Construction method
- 4. Riprap block sloping breakwater
- Date completed
- 6. 31 Mar. 1969
- 7. Date damaged
- 8. 5 Aug. 1971
- 9. Typhoon No. 19
- 10. Damage status
- 11. The foundation base of 146.0 m of the sloping levee cusp composed of tetrapods was washed out by flooding of the Oyodo river (4552 t/sec) and waves, and it subsided 1.5 m.
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. Riprap part
- 21. Foundation mound
- 22. Overlay
- 23. Consolidation blocks
- 24. Precast concrete armor units
- 25. 5.0 t and 8.0 t tetrapods, random rubble
- 26. Dissipation works
- 27. Design data
- 28. Wave height
- 29. Wave pressure
- 30. Breakers
- 31. Period
- 32. Angle of incidence
- 33. At time of damage
- 34. Amount of damage
- 35. Levee body damage
- 36. Levee body slope
- 37. Condition of levee body damage
- 38. Dispersion of overlay
- 39. Dispersion of foundation mound
- 40. Dispersion of consolidation blocks
- 41. Dispersion of dissipation works
- 42. 155 5.0 t tetrapods and 782 8.0 t tetrapods
- 43. Natural conditions
- 44. Visual measurement

- 45. Wave direction
- 46. Tidal level
- 47. Duration
- 48. Unknown
- 49. Wind velocity
- 50. Method of restoration
- 51. Restored to original condition because of the serious extent of subsidence because of washing out and scouring.

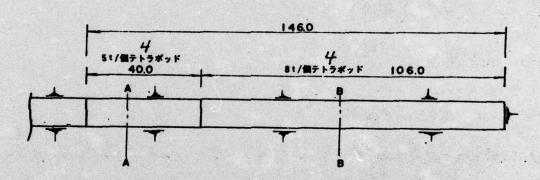
逐渐争获规定和

-- 225 ---

被災施設位置図

* 3 (1) ** (1) ** (2) ** (2) ** (3) ** (3) ** (4)

被災售所平面図 3

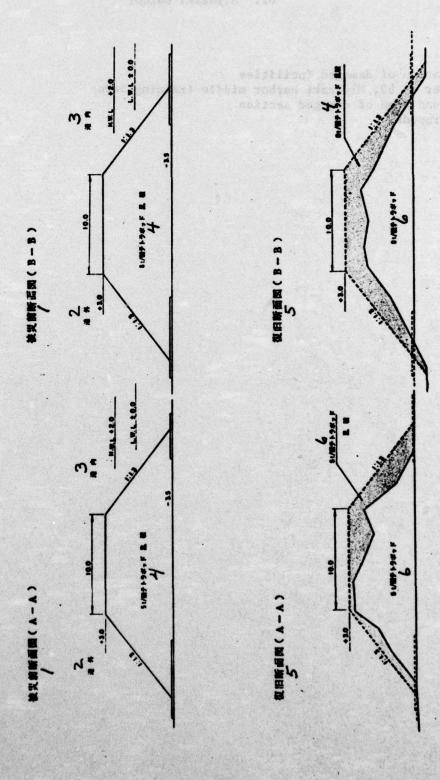


4,50

61. Miyazaki Harbor

Was de in Erecuei

- Location of damaged facilities
 Refer to 60, Miyazaki Harbor middle training levee
 Ground plan of damaged section
- 4. Tetrapods



| | | 1311年 1111年 1111日 | | E 中京和韓國。 | A P |
|--|-------------------------|--|---|---|------|
| Outer harbored retraped re | or or andom rubbl | | | | H. |
| Tetrapods | | 公共中央189号中部至(张克)。 | | 14 = 3 4 10 = 1 | N |
| | | North Livery | 1 9 H | are, ket or | 18 |
| | | | | * | 1 34 |
| E. 7 E. 7 E. | | A STATE OF S | 2-145 | Self-state and the self-self-self-self-self-self-self-self- | |
| | | S. D. S. | And the light by the Andrew Street Street | 8 2 N 8 | |
| | and the second | E SHONERENI SE | RSU ST | | |
| t e m t lack libra | | SANCTON I | Street, a linear of the contract of | 10000000000000000000000000000000000000 | |
| | | and a second file of the second secon | | 3 4 4 5 | |
| AR RETAIN | | Products algorithms | gri camer | # 6 | 五颗 |
| TER T | 1 38 x | #0 x - 2 to H | A TEN | # 21 11 | |
| 40.00 | A Wys | A prompted in record of the boundaries of the second | 数の分成 | | |
| | | / 95 - 4 | 4 4 4 4 | | l Co |
| | | . 26.0 d. 85.1 s | | CONTRACTOR OF THE PARTY OF THE | |
| | | | 10 M O 2 | | |
| | | 14.18 | | 祖 集 被 | 被 |
| · · · · · · · · · · · · · · · · · · · | | 38 3 2 | | | 18 |
| | | William Tanzeeman | a mod | 's K L | |
| ering Source progress in the | B C) 6 10 | S WHAT THE TANK | a re | | |
| AL SECTION | a ZZ A | 1 | 104 A. 3 | * * | |
| a manada da Marada, para da la cara da Arada da | 本工业数 | | do 44 98 | 19 JU | |
| 18年4月上年後 | | And the second s | do anima na mana | 7.1 | K B |

| 地(| 区施 | 段名 | 2# | 沈 堤 | | 3佛造樣式 华重矢板式 | たおよびプロック式起成場 | | | |
|-----|------------|----------|---|-----------|--------------------------------------|--|---------------------|--|--|--|
| 完成年 | 手月日 | 6昭 | 1044年: | 3 月 | 7被炎年月日 8昭和 | 4年6月28日~7月7 | 日 9(梅雨前線) | | | |
| 被人 | 0 克 | 2 | 2 4. 0 mi | はプロック式混 | | はPC矢板による二重ダ の出水(3090t/se が散乱した。 // | | | | |
| | 13 | | 5 = > 1 | | (矢板)天端巾 5.8 m | (745) B H L | B H L 2.7×1.2×25 | | | |
| | | 127 1970 | トケ板はぴプロ | コンタカート | (プロック)1:3 | : 6 /8 | | | | |
| 12 | 立 | | | # 19 m | i – , | | | | | |
| * | | | '7 | 中 20 ta | (矢板部)栗石 2 | 単位体積重量 | 不明 | | | |
| | | 上部 | 場所打2 | シクリート | (矢板部)27:2: | 4 (プロック部 |) 1:3:6 | | | |
| | 24 | * 6 | S 5 | (プロック音 | B) 40kg/個 26 | | | | | |
| 英 | 78 | 数2 | a I | te 128 | | | | | | |
| | 石 | | 39,, | | 第)3.5 t/個六脚プロ | 1230 | | | | |
| | - | 荷波 | 乳., | (矢板部) | 参外、8.0 t/個六脚プロ | ッ 32(ブロック部) 8 | Ot/個六脚プロック | | | |
| 育 | | M. 2 | 74 石 | t L 28 | t L 28 | | | | | |
| | 34 t | 0 | fit. | 5矢板部 4 01 | 69/日および400kg/日 | 模固拾石。 沈床工(三層 | ゴム板, 厚2%) | | | |
| | X 12 | | | # 37 # | H 1/3 = 5.0 m | ₩ 38 E | 本男39 | | | |
| | 200 | | | m 40 m | | 入州州为 | β=70° | | | |
| | 13 | | 6 + ~ 0 | | | | | | | |
| | 智 | 立 | | 50 4 \$ | | | | | | |
| * | 炎 | - | | 資価の状态 | | | | | | |
| | | 24 | CONTRACTOR OF THE PARTY OF THE | 子の散器 | | | | | | |
| 42 | D | 石 | | 名の数部 | | | | | | |
| 类 | | | | 49,00数部 | | | | | | |
| | | | 榜被 | Ton a | 延美3980元·数 | 不明 | | | | |
| | | 34 | * | 0 1 | 沈珠工、延長398 | 0.52 | | | | |
| - | , | 自然条件 被 | | 37 * | - | m 40 m | - 4 4 | | | |
| | 自然 | | | 64 M | | ₩ 55 W | - 200 | | | |
| | | | | 铁 時 間 | | ■ 57 ≥ | - | | | |
| • | n 7 68 | | | | 19.0 t/個大脚プロッ 58.0 t/個大脚プロッ 59 | ンゴを一 1.5 m まで施工・クを施工し復旧した。 | しその上に+4.0m | | | |

Key:

- 1. Regional facility name
- 2. Training levee
- 3. Construction method
- 4. Multiple sheet pile and block composite breakwater
- 5. Date completed
- 6. March 1969
- 7. Date damaged
- 8. 28 June-7 July
- 9. Frontal line of summer rain
- 10. Damage status
- 11. Harbor side 174.0 m of the total 398.0 m damaged sector consisted of double sheet pile with PC sheet and the adjoining 224.0 m of a block composite breakwater, but the outer harbor side basin was widely excavated by flood waters of the Kawauchi river (3090 t/sec) and 6-legged dissipation (consolidation) blocks were scattered.
- 12. Prior to damage
- 13. Vertical part
- 14. PS concrete sheet pile and block
- 15. Dimensions
- 16. (Sheet pile) top width (block)
- 17. Concrete
- 18. (Block)
- 19. Reinforcing steel
- 20. Fill
- 21. (Sheet pile part) cobble stone. Unit volume weight unknown.
- 22. Upper concreting in site
- 23. (Sheet pile part) 1:2:4 (block part) 1:3:6
- 24. Riprap part
- 25. Foundation mound
- 26. (Block part) 40 kg/piece
- 27. Overlay
- 28. None
- 29. Consolidation blocks
- 30. (Block part) 3.5 t 6-legged blocks
- 31. Precast concrete armor units
- 32. Outside harbor (sheet pile part) 8.0 t 6-legged blocks; (block part) 8.0 t 6-legged blocks
- 33. Dissipation riprap
- 34. Other
- 35. Sheet pile part 40 kg and 400 kg consolidation riprap mattress (3 layered rubber sheets, 2 m/m thick)
- 36. Design data
- 37. Wave height
- 38. Wave pressure
- 39. Unknown
- 40. Period
- 41. Angle of incidence
- 42. At time of damage

- 43. Amount of damage
- 44. Levee body slide
- 45. Levee body slope
- 46. Condition of levee body damage
- 47. Dispersion of overlay
- 48. Dispersion of foundation mound
- 49. Dispersion of consolidation blocks
- 50. Dispersion of dissipation works
- 51. 398.0 m extension, amount unknown
- 52. Mattress, 398.0 m extension
- 53. Natural conditions
- 54. Wave direction
- 55. Tidal level
- 56. Duration
- 57. Wind velocity
- 58. Method of restoration
- 59. Slabs were put in to -1.5 m to protect the front basin that had been washed out; on top of this 8.0 t 6-legged blocks were placed to a height of +4.0 m to protect the levee body, thus restoring the levee.

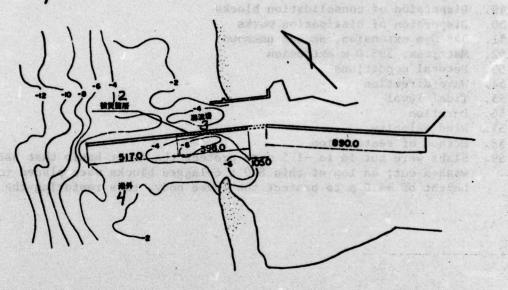
. 中面节 斯爾美森

think when ward equil when one

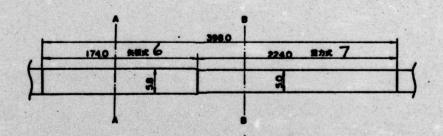
badderion of twee body decage

boson addisamon to network!





後災衛所平面間 5



62. Sendai Harbor

2.4.一本个网络接领处理

(人) (4) 随即推进的

Key:

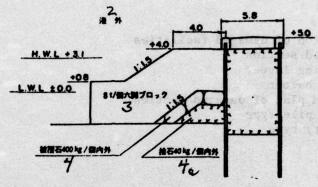
- 1. Location of damaged facilities
- 2. Damaged section
- 3. Training levee
- 4. Outer harbor
- 5. Ground plan of damaged section
- 6. Sheet pile type
- 7. Gravity type

---- GIS ----

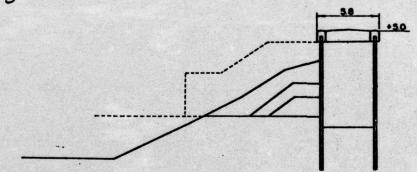
200

\$1 5 per - (1255-94)

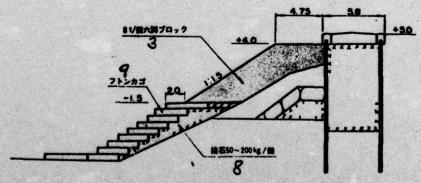
後災前断面図(A-A)



後災時新面図(A-A)



復和新菌園(A-A)



282

62. Sendai Harbor

作及中部) 图题情能更增

工量一定与协概联络资源

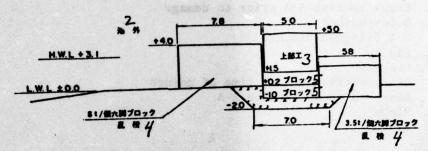
全有一身 医超级处理器

Key:

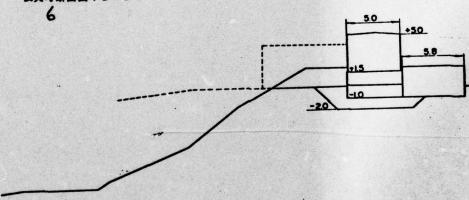
- 1. Cross section A-A prior to damage
- 2. Outer harbor
- 3. 8 t 6-legged blocks
- 4. Riprap
- 4a. Overlay
- 5. Cross section A-A at time of damage
- 6. Restored cross section A-A
- 7. Slabs
- 8. Riprap

U. OCH MANA

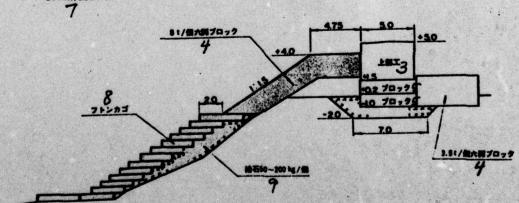
被災前断面図(B-B)



後災時斯面図(B-B)



後旧新画図(B-B) 7



京 品 得过 本 克 雅 田 泰 丁

· 中国以下河湖南湖

41.4 # TV. 产管房理

4 小

e and the se

a d o de a

12 mmag.

物能燃烧

哲 核 均 游

20 10 10 10

energy his way

Key:

- 1. Cross section prior to damage
- 2. Outer harbor
- 3. Superstructure

Charles to

- 4. 6-legged blocks
- 5. Blocks
- 6. Cross section at time of damage

SER FIT WER

- 7. Restored cross section
- 8. Slabs
- 9. 50-200 kg riprap

- 122 ---

EQ WFES milling

· WEETCHE

DE 模 革

ST 10 74

63 栗 生 港

| 地 [| 区施 | 段 名 | 2防 | 波 堤 | | 3構造8 | 女 4拾7 | 0 7 | ク式傾象 | · · |
|----------|------------|---------------------------------|----------|------------------------------------|--------------|-----------|----------------|------|------------|---------------------------------------|
| 完成年 | F月日 | 6昭和 | 043年 | 3 月 | 被災年月日 | 8昭和43年9 | 月24日 | | 90 | 台風 1 6号) |
| 被 / | 0 规 | 被災 | 区域は | 島状になってお // |) 全長 4 5.1 m | n に亘って彼によ | り花下また | は数 | ALt. | es Pecco rd, Para 3 Successoria |
| | 13 | | | 寸 15 株 | - | | in the same | | | r edeo.ix |
| | | * | L | コンタロート | - | 8,5085 1 | | | | |
| 12 | 立 | | 14 | 鉄 17 筋 | | | | | | 100011 |
| * | 都 | | | 中 18 箱 | - | | | | | |
| | | | | コンクリート | - | | den San Silvin | | | |
| X | 20 | | · 指石 | | | | | | | |
| | - | 被27 | | | | | | | | g. |
| | 75 | | 23., p | * 14 | | | | | | |
| | # | 構設プロック 16.1 t/個六脚プロック、乱積 | | | | | | | | |
| | - | | Ph E | | | | | | | |
| | 26 + | 0 1 | | 2 114 | T | | — | - | | - 20 |
| | 27 R | # 9 | # · | # 28 # | | | 29 | Æ | 孙 i | # 30 |
| | | 13 | | 月 3/ 月 3 サベ b | | 2 | 入33射 | * | 7- | |
| | 35 | 立 | - | 370 # # | - | | | | | |
| 34 | | # | 10 th | Bott | - | | | | | |
| * | 类 | 20 | * # | 7 0 2 2 | _ | | 100 | | | |
| | * | 槽 | 3 0 | 42 o m s | _ | | | | | |
| | | 石 | 根据フ | # . , ou | - | | | | | |
| | | | 前被 | 4 · · · | 延長45.1 | m. 数量不明 4 | 3 | | | |
| | | 26 | 26 + 0 1 | | | | | | | |
| | ,, | 44 被 28 高 動業条件 被 45 向 | | H 1/3-3 | .0 m | m 3/ | M | 不 ! | H 32 | |
| | 自然 | | | 不明32 | 2 | m 46 | 做 | +3.0 | | |
| | | | 47= | 雅 時 間 | 不明 32 | | m 48 | × | 級大 開級 | 19.0 m/m 4 |
| | 50 由 方 | 独 | #.FE | 後旧 5/ | | | | | | |

63. Kurio Harbor

Key:

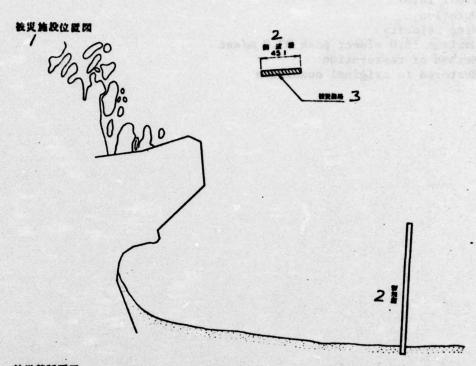
- 1. Regional facility name
- 2. Breakwater
- 3. Construction method
- 4. Riprap block sloping breakwater
- 5. Date completed
- 6. March 1968
- 7. Date damaged
- 8. 24 Sept. 1968
- 9. Typhoon No. 16
- 10. Damage status
- 11. The damaged sector turned into an island and was overreached on a total length of 45.1 m; it settled or was scattered by waves.
- 12. Prior to damage
- 13. Vertical part
- 14. None
- 15. Dimensions
- 16. Concrete
- 17. Reinforcing steel
- 18. Fill
- 19. Upper concreting in site
- 20. Riprap part
- 21. Foundation mound
- 22. Overlay
- 23. Consolidation blocks
- 24. Precast concrete armor units: 16.1 t 6-legged blocks, random rubble
- 25. Dissipation works
- 26. Other
- 27. Design data
- 28. Wave height
- 29. Wave pressure
- 30. Breakers
- 31. Period
- 32. Unknown
- 33. Angle of incidence
- 34. At time of damage
- 35. Amount of damage
- 36. Levee body slide
- 37. Levee body slope
- 38. Condition of levee body damage
- 39. Dispersion of overlay
- 40. Dispersion of foundation mound
- 41. Dispersion of consolidation blocks
- 42. Dispersion of dissipation works
- 43. 45.1 m extension, amount unknown
- 44. Natural conditions
- 45. Wave direction

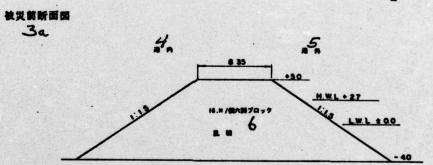
- 46. Tidal level
- 47. Duration
- 48.
- Wind velocity
 Maximum 19.0 m/sec; peak 33.0 m/sec 49.

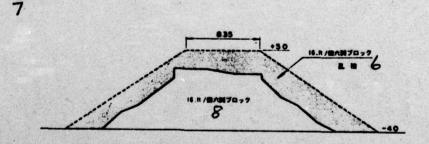
TERLAND

- 50. Method of restoration
- 51. Restored to original condition

热质键纹色







Key:

- 1. Location of damaged facilities
- 2. Breakwater
- 3. Damaged section
- 3a. Cross section prior to damage
- 4. Inner harbor
- 5. Outer harbor
 6. 6-legged blocks (random rubble)
 7. Cross section at time of damage
 8. 6-legged blocks

6. Meteorological Conditions at Time of Damage

The terminology and conditions of the elements believed to have caused damage in the 63 cases at 49 harbors recorded in this report are taken from publications of the Meteorological Agency. They are given in chronological order. Dates indicate actual day or days when damage occurred. Harbors suffering damage are in parentheses.

(1) Low pressure system, 8-10 Jan. 1965 (Monbetsu, Abashiri).

A low pressure system which developed at 3:00 on 7 Jan. in the Bashi Straits moved in a NE direction and developed rapidly. By 15:00 on the 8th offshore from Choshi the pressure fell to 986 mb. At the same time a low pressure system moving east from Korea was advancing 300 km west from Sakata and had a reading of 986 mb at the center. Isobars enclosing these two systems extended out 3000 km. These two later merged into one system over the ocean east of Aomori at 9:00 on the 9th and lowest pressure was 962 mb.

The whole of northern Japan and the Sea of Japan experienced a severe storm.

(2) Low pressure system, 21 Feb. 1965 (Rumoi).

A low pressure system which developed over the Sea of Japan on the 20th developed rapidly, passing over Hokkaido on the 21st when the pressure was 990 mb at 15:00. Later it moved toward Chishims and stagnated. Stormy weather prevailed in the northern part of the East China Sea and waters near Hokkaido.

(3) Heavy rains, 23 July 1965 (Etsu).

A frontal line in the Sea of Japan moved southward on the 21st and remained stationary from the western side of Japan to the western part of Hokuriku. In addition a low pressure system advanced eastward and combined with the front caused very heavy rains in Japan along the eastern coast from the 21st to the morning of the 23rd. New rainfall records were set in Tottori and Ogi.

(4) Typhoon No. 24, 17-18 Sept. 1965 (Numazu, Tago).

A tropical depression which developed over the ocean 300 km west of Guam at 3:00 on the 3rd grew in intensity as it moved NNW. It stagnated on the 15th as it continued to develop 700 km east of Taiwan where it registered 932 mb at its peak. After this it took a NE course and increased speed. When it reached Cape Daio at 21:00 on the 17th it had a pressure of 955 mb. It weakened and began to break up at 23:00 after making another landfall at 21:00 in the Atsumi peninsula. It registered 964 mb 30 km south of Iiida-shi in Nagano-ken. Secondary low pressure developed between

Nagano-shi and Hamamatsu-shi and the main part of the typhoon weakened rapidly and merged with the secondary low pressure system. It later moved to the Sea of Japan and built up 70 km SSW of Sakata with a pressure of 968 mb. Moving NNE and weakening it made a landfall at Akita and then went on to the Okhotsk Sea from the area near Urakawa. This gave rise to strong winds and storm conditions all over the coastal areas of Japan.

(5) Low pressure system, 16-17 Dec. 1965 (Teuri, Yoichi).

A low pressure system which developed over the Yellow Sea entered the Sea of Japan at midnight on the 14th and moved NE as it intensified. It reached the area east of Rumoi at 3:00 on the 15th and then moved northward. Reading 932 mb it reached the southern part of the Mamiya Straits, stagnated and continued to develop, registering 978 mb at 15:00 on the 16th; it moved out to the Okhotsk Sea on the 21st.

Simultaneously a Siberian high reading 1080 mb developed and this resulted in strong winds and stormy seas near the northern coasts of Japan.

(6) Winter storm, 19-22 Jan. 1966 (Ryotsu, Kashiwazaki).

A low pressure system developed in the northern part of Korea on the 16th and it crossed the northern part of Hokkaido on the evening of the 17th, entering the Okhotsk Sea. At 3:00 on the 18th it reached the Chishima Islands and read 992 mb. It stagnated until the 21st. At the same time the southern part of a continental high of 1060 mb extended over to western Japan and maintained this position until the 21st. Heavy wind and snow buffeted the Sea of Japan region and the central mountains.

(7) Low pressure system, 5-6 Mar. 1966 (Iwanai).

A low pressure system at sea moved NE on the 4th, passed over the Sea of Japan and developed rapidly. By the evening of the 5th offshore from Chishima it registered 972 mb. This gave rise to stormy seas as it passed from the Yellow Sea, northern part of the East China Sea, and seas east of Honshu and the northern part of Japan.

(8) Low pressure system, 28-30 Oct. 1966 (Kutsugata).

A low pressure system which had developed near Vladivostok early on the 28th moved ENE and reached the western part of the Soya straits, registering 986 mb at 15:00 on the 28th. Another system which passed over Sanriku from the Kanto region and moved north reached the southern part of Cape Erimo and went on to the Okhotsk Sea. These two systems were influenced in Hokkaido by a front accompanying low pressure on the Sea of Japan, giving rise to heavy wind and rain from the 28th to the 29th.

(9) Low pressure system, 20 Dec. 1966 (Abashiri).

On the evening of the 19th there was a strong low pressure system offshore from Akita and the southern part of Saghalien. This advanced to the east, reached the Chishima area by the morning of the 20th and ran

along the Chishima chain, registering 970 mb at 21:00 on the 20th and 956 mb on the 21st. This resulted in severe storms in the Okhotsk Sea and the seas east of Hokkaido.

(10) Low pressure system, 22-24 March 1967 (Hakodate).

A low pressure system which crossed the Sea of Japan early on the 22nd changed course to the NE offshore from Akita, crossed the southern part of Hokkaido on the 23d and at 9:00 on this day registered 986 mb at the center. It then left the eastern part of Hokkaido for open seas. At this time another system offshore from Kanto on the 22d moved NE, passed offshore from Sanriku and moved over the sea east of Hokkaido. It fell to 976 mb on the 23d.

The passage of these two systems resulted in severe storms on the Sea of Japan, Tsugaru straits, and the sea east of Hokkaido.

(11) Typhoon No. 27, 21-22 Sept. 1967 (Cape Shiriya).

Typhoon No. 27, which developed over the South Seas, moved in a NW direction, and registered 964 mb at 15:00 on the 21st over the eastern ocean far from Kanto, then altering course to NE. A low pressure system that had developed on the 21st over the ocean south of Kanto moved northward between the mainland and the typhoon. The combined effect of these systems was severe storms offshore from Sanriku.

(12) Typhoon No. 34, 27-28 1967 (Ukusu).

A weak tropical depression which had developed at 9:00 on the 16th became Typhoon No. 34 280 km SE of Guam on the 17th. It advanced from WSW to NW as it developed and registered 950 mb on the morning of the 23rd. It gradually weakened as it approached Japan and registered 968 mb when it made a landfall at 3:00 on the 28th. After passing over the southern part of Aichi-ken, it split into three parts and became a tropical depression. The center passed over Japan, and went out to see off Sanriku, forming one center on the 29th over the sea east of Hokkaido. It strengthened (984 mb) and reached the Chishima Islands. Stormy conditions resulted as it intensified, especially on the Pacific side.

(13) Low pressure system, 9-11 Nov. 1967 (Kushiro).

A low pressure system developing offshore at 9:00 on the 8th advanced NE and read 980 mb at 3:00 on the 9th. It moved on to the southern part of the Okhotak Sea. It was down to 968 mb when it reached Kamtchatka on the 10th. At the same time a high pressure system of 1052 mb appeared on the continent and assumed a winter type position. This resulted in severe storms in the Sea of Japan and seas in northern Japan.

(14) Low pressure system, 14-16 Jan. 1968 (Kanazawa).

A low pressure system which had developed at 3:00 on the 12th moved to the Sea of Japan, developed rapidly and fell to 982 mb at 21:00 on the 13th. Another system developed in the southern part of the Kii peninsula

at 21:00 on the 14th and advanced from Sanriku to the ocean E of Honshu. At 9:00 on the 16th it merged with low pressure from the Sea of Japan in the northern part of Chishima and approached typhoon status with 986 mb. A continental high followed these systems, extending near Japan, giving seasonal winds and storms from the 14th to the 16th. This combination resulted in stormy conditions in the Sea of Japan, areas in northern Japan, and even coastlines on the Pacific side.

(15) Low pressure system, 15 Feb. 1968 (Karatsu).

The front of a low which developed near Taiwan on the 14th moved NE rapidly, deepening as it advanced. It changed course from W to ENE of the Amami Islands and registered 980 mb as it entered the area SE of Kyushu at 12:00 on the 15th. It paralleled the main land mass as it moved eastward, reaching the ocean east of Kanto. There were stormy conditions on the Pacific coast, Yellow Sea, East China Sea, and the Sea of Japan.

(16) Typhoon No. 4, 28 July 1968 (Hiwasa).

A weak low developed ENE of Guam on the 19th and advanced WNW as it developed and became Typhoon No. 24 [sic]. It turned NW and fell to 925 mb at 9:00 on the 24th. This typhoon gradually weakened and reached land at 19:00 on the 28th near Susaki in Kochi-ken as it meandered and advanced NW, at which time the pressure at the center was 975 mb. After the landfall it crossed Shikoku and split into two centers near Akinada at 21:00. One center went off to the Sea of Japan from Hamata at 1:00 on the 29th and diminished. The other center shifted course to the SW at 3:00 on the 29th and became a tropical depression 40 km NW of Nagasaki at 15:00. It later changed course to the E and crossed Kyushu, advancing NE as it moved eastward from south of Shikoku and headed for the Aleutians. This produced severe storms on the Inland Sea, southwestern part of the Sea of Japan, East China Sea, etc.

(17) Typhoon No. 16, 24 Sept. 1968 (Kurio).

A weak tropical depression 250 km east of Saipan moved northward on the 12th. Moving north from the 15th it stopped near Torishima and at 6:00 on the 18th became Typhoon No. 16. The typhoon changed course to WNW and registered 930 mb 250 km SSE of Miyako Island at 9:00 on the 22d. Advancing northward it registered 955 mb at 22:00 on the 24th and reached land in the northwest part of Kagoshima-ken. After this it weakened rapidly and moved along the south coast of Kyushu. It advanced in loop-like fashion from Saga-ken to Nagasaki-ken and became a weak tropical depression at 12:00 on the 25th. This produced storms in the East China Sea on the 25th and 26th. Large wind waves were created on the southwest part of the Sea of Japan, the Inland Sea, and the south coast of Shikoku.

(18) Low pressure system, 5-6 Feb. 1969 (Kutsugata, Iwanai, Tottori, and Yagishiri).

A weak low which developed in the southern part of the Sea of Japan on the morning of the 4th grew rapidly and read 994 mb on the morning of the 5th near the Tsugara straits. Another system that arose near Taiwan

on the 3rd registered 990 mb as it developed offshore from Fusae. At 21:00 on the 5th the one near Nemuro registered 974 mb and the second off Sanriku 992 mb. Moving NNE to N they joined in the southern part of the Okhotsk Sea on the morning of the 6th, falling to 964 mb and developing as a large typhoon which produced severe storms on all seas surrounding Japan as well as the Inland Sea.

(19) Frontal line of early summer rains, 28 June-7 July 1969 (Sendai).

Rains falling over southern Kyushu on the 28th continued into the night and spread over the whole region, gradually increasing in strength and falling over the Shikoku-Kinki area as well. A center of very heavy rain over southern Kyushu, and a long narrow zone of rainfall stretched from southern Kyushu to southern Shikoku early on the 29th. Heavy rains continued throughout the morning as the front moved south, but these lessened at 1:00. The rains increased in intensity in southern Kyushu on the 30th with rain falling in the mountains of Chubu and Tokai. After advancing north the rain area formed an east-west zone from western Kyushu to Chugoku. Total rainfall for the period 28 June to 2 July was 400-500 mm.

(20) Low pressure system, 31 Jan. 1970 (Niigata, Himekawa, Onahama).

A low pressure system developed on the 29th west of Okinawa, moving NE as it deepened rapidly, passing over Kinki, Tokai, Kanto, and Tohoku, and going out to sea on the 31st at Iwate-ken. At the same time a low which had developed on the 29th in the Sea of Japan crossed the Kinki region on the 30th and merged with the other low. These combined systems were located over the sea east of Hokkaido on the morning of the 1st with a reading of 960 mb, much as a typhoon. This system had a path rare for this time of year and it was called the "low of January 1970" because of its size and amount of damage. Severe storms were generated everywhere.

(21) Typhoon No. 2, 5-6 July 1970 (Shiroko).

Typhoon No. 2 developed in the Caroline Islands and reached the Okinawas on the 2nd and 3rd. Winds strengthened on the 3rd. After reaching Muroto on the afternoon of the 5th, it changed course to the north and registered 960 mb at 18:30. It reached land near Sumami in the southern part of the Kii peninsula. It then weakened rapidly, passed Osaka bay and Kyogo-ken, and entered the Sea of Japan where it moved NW as a tropical depression. There were severe storms in the region south and west of Kyushu and in the passage between Shikoku and Kii as well as heavy wave action in the area west of Kanto.

(22) Typhoon No. 9, 14 Aug. 1970 (Wakizaki).

A tropical depression formed on the 9th 300 km NW of Torishima and became Typhoon No. 9 350 km at sea south of South Daitoshima. It passed over the Amami Islands and moved to an area SW of Kyushu. The pressure was 945 mb at 23:00 on the 14th. It made a landfall near Nagasaki and moved over the northern part of Kyushu, going out to the Sea of Japan from

Hagi-shi. It weakened rapidly after going over water but wind velocity increased and it moved N out of the southern part of the Sea of Japan. The storm crossed Hokkaido on the 16th and entered the Okhotsk Sea. As a result there were severe storms in the East China Sea and off Shikoku from the 13th to the 15th. This also affected the Sea of Japan, Inland Sea and the Pacific coast north of Tokai.

(23) Typhoon No. 10, 21 Aug. 1970 (Sakai, Imabari, Murotsu, Kurei, Kaminogae, Shimoda).

A tropical depression 300 km NE of Saipan at 9:00 on the 15th became Typhoon No. 10 at 12:00 on the 16th. It moved WNW, then NW and registered 910 mb at 3:00 on the 20th. It then weakened as it approached Shikoku and read 960 mb at 8:00 on the 21st, reaching land in southwest Kochi-ken. By 10:00 it had gone from Matsuyama to the Inland Sea and made a second landfall near Kure at 12:00, passed over southern Chugoku, and went on to the Sea of Japan at Matsue at 15:00. At 3:00 on the 23rd it became a tropical depression on the southern edge of Karafuto and entered the Okhotsk Sea. Great damage resulted in the Sea of Japan excepting Shikoku, the Inland Sea, and Hokuto.

(24) Low pressure system, 4 Jan. 1971 (Hamata).

On the 2nd a low was located in the Yellow Sea and registered 990 mb at 21:00 on the 4th. Approaching Oki Island it continued SE and dissipated in the mountainous area of Chubu. At the same time a strong high of 1046 mb NW of Bokkai created a strong pressure differential on the side of Japan toward the Sea of Japan, giving rise to strong winds and snow storms.

(25) Low pressure system, 16-17 Jan. 1971 (Miyako).

A low over the Sea of Japan produced cold eddies and reached Sanriku on the 16th. It registered 998 mb at 3:00 on the 17th, remaining stationary with the same pressure at 9:00 on the 18th. At the same time a large continental high of 1040 mb created a strong pressure gradient, resulting in high winds and stormy conditions over many hours from the 17th to the 18th in the Tohoku region.

(26) Low pressure system, 29-30 April 1971 (Onahama).

Low pressure systems developed in western Kyushu and southern Korea on the morning of the 28th and advanced ENE. The system on the southern coast advanced to the southern part of the Kii peninsula at 9:00 on the 29th, moved along the coast, and reached Kanto on the morning of the 30th. This caused heavy rains on the Pacific coast and strong wind waves on the coastlines of the Sea of Japan and the Pacific.

(27) Typhoon No. 19, 5 Aug. 1971 (Miyazaki).

A tropical low 700 km E of Guam on 25 July reached the area SW of the Ryui Islands and became Typhoon No. 19. It meandered somewhat, then advanced NW and drew a loop near Yaku Island at 13:00 on the 4th. It then registered 935 mb at the center. Weakening after this it advanced northward unseen and read 950 mb at 9:50 on the 5th. It made a landfall on the Shimabara peninsula near Nishiarie, crossed the straits and landed again south of Saga-shi at 11:40 on the 5th. At 13:00 it went out to the Sea of Japan at Hakata bay, advanced NE, and became a temperate low at 12:00 on the 7th near the Soya straits. There were stormy conditions from the eastern part of the East China Sea to Shikoku and the Inland Sea. Similar conditions prevailed in Kanto and the Sea of Japan areas. This typhoon produced heavy rains and more than 500 mm fell near Miyazaki in a 24 hour period. Total rainfall was over 1000 mm.

(28) Typhoon No. 23, 30 Aug. 1971 (Nobeoka).

Typhoon No. 23, which was south of Torishima on the 21st, advanced W-WNW, turned course to NE at 9:00 on the 29th, and registered 920 mb near Cape Sata at 21:00. Weakening somewhat, this typhoon passed the southern Pacific coast and reached Honshu on the 31st. Heavy storms prevailed from the seas off southern Kyushu to the seas near Japan. Some 400-800 mm of rain fell along its course and this exceeded 1000 mm in Kyushu.

(29) Typhoon No. 26, 11-13 Sept. 1971 (Ena, Nakanosaku).

A low which had developed in the southern seas at 9:00 on the 4th took a west to north course and became Typhoon No. 26. The pressure was 920 mb at 3:00 on the 11th as it advanced NW, approaching Boso on the 13th. It did not make a landfall but turned northward, passed Sanriku, and moved toward Chishima. High waves were generated on the Pacific coast from Tohoku to Hokkaido.

(30) Low pressure system, 9 Nov. 1971 (Abashiri).

A winter-type low of 996 mb developed over the sea SE of Chishima on the 8th but overnight rose to 1000 mb and neared Abashiri. This produced storms in the northern Sea of Japan on 8 and 9 Nov.

(31) Low pressure system, 11-12 Jan. 1972 (Kashima, Atami).

A low which developed near Iskigaki Island at 21:00 on the 9th advanced NE, arriving at Gada Island and changing course to ENE. It became a small typhoon 200 km offshore from Cape Mizuumi at 21:00 on the 11th, registering 980 mb. It developed further and crossed over the ocean south of Kanto and registered 956 mb. This created storms along the coast except for the northern Sea of Japan.

(32) Low pressure system, 14 Feb. 1972 (Kushiro).

There was a weak low in the southern Sea of Japan on the 13th, which advanced northward and fell to 992 mb at 21:00 on the 4th. Another low near Taiwan moved along the south coast of Japan from 13 to 15 Feb. in an ENE direction. The two lows remained separate, one reaching the Okhotsk Sea

and the other the seas east of Honshu on the 16th. Winds and storms prevailed in all of the coastal areas.

(36) Low pressure system, 28 Feb. 1972 (Tokachi).

A low pressure system on the Pacific side of western Japan arrived at Tokaido from Shikoku on the 27th and was recorded at 976 mb. Another low from northern China entered the Sea of Japan, and a low developed off Akita on the 27th, all of them advancing NE. They merged into one system over the seas west of Hokkaido on the 28th and remained stationary, creating severe storms.

(34) Typhoon No. 20, 16-17 Sept. 1972 (Hamana, Yokkaichi).

Typhoon No. 20, which was over the seas east of Kyushu on the 14th, moved northward, registering 960 mb on the morning of the 16th. It moved on 300 km S of the Amami Islands and changed course to NNW, going ashore at Cape Misuumi at 18:00. Early on the 17th it entered the Sea of Japan from Toyama. It weakened somewhat over land, but fell to 978 mb over the Sea of Japan, then gradually weakened, crossing the southern part of Hokkaido and reaching Chishima. This produced stormy conditions over a large area on the seas to the south and even to the north.

(35) Low pressure system, 1-2 Dec. 1972 (Wajima).

A low from China entered the Sea of Japan on the morning of the 30th and fell to 986 mb at 9:00 on the 1st on the seas south of Hokkaido (Oshima peninsula). This created strong winds from the morning of the 1st onward in the Hokuriku region to the coasts on the northern Sea of Japan.

(36) Low pressure system, 24 Dec. 1972 (Kashima).

A low which had developed near Taiwan on the morning of the 22nd advanced NE, crossed the East China Sea and the Kii peninsula and the southern coast of Honshu, moving ENE and reaching Oshima. After this on the evening of the 24th it reached the seas off Boso. There were strong winds from Kyushu to Kanto and severe storms on the coastlines.

first a manual of . The or source course to the backers and the service of

The day laged further and ciostad over the cours worth of Kanto

Your one a mak look to the continue des of layer on the little which

accepted in trained and exit to the do at 21 th on the other Addition for and the other law man filterior would brough the doubt court of tapon feed in to Tr Fabrus and the discretion. The two laws contined superstell one resemble the Oktobeth Res

7. Table of Damaged Facilities Investigated

A) Categon sinking valuet

The damaged facilities summarized in the charts are outlined in Table 1. Those recorded are considered important for the various damaged facilities. The number assigned to the harbor name is generally the same one as the date of damage of restored works and the determined number is identical, differing from the standard cross section. Ones in construction stages are based on this.

Following are more detailed explanations of the items covered.

a) Wave height H 1/3

This is significant wave height at time of damage, recorded at the actual site damaged, but we also enter reports of "unknown" and H max.

b) Tidal level

This is for the time of damage. When "unknown" is recorded for the site, H.W.L. is given in parentheses for reference.

c) Established water depth

This is the normal basin height in front of the breakwater.

d) Crown height

The parapet height, where a parapet is present, is taken as crown height of the breakwater.

e) Height of the vertical part lower edge

This is the standard height of the lower edge of the vertical part of caisson breakwaters, block breakwaters, etc. For foundation mound it is the height of the foundation mound crown.

f) Height of riprap crown

With base works, overlay, and wave dissipating works made of riprap or irregular blocks the crown height is that most exposed to direct waves. This does not include consolidation blocks using consolidated rubble.

g) Sea floor slope

This is slope in front of the damaged breakwater. Local reports are entered in standard cross section diagrams prior to damage. We determined this from water depth charts ourselves where no report was made.

h) Caisson sinking weight

With caissons we consider this weight as the buoyant force when the whole caisson and superstructure are immersed in water. The following assumptions are made here:

- 1. Unit volume weight of 2.3 t/m3 for the caisson and concrete.
- 2. Unit volume weight of 2.3 t/m3 for concrete in superstructure.
- 3. Unit volume weight including fill water has recently been set at 1.9 t/m³ and this is considered appropriate. We use 1.9 t/m³ even when this differs from local reports. With "unknown" reports we assume sand is used, but before the war almost all in Hokkaido used concrete, and pre-war concrete was 2.3 t/m³. Otherwise we use the reported values.
- 4. Where the thickness of caisson walls is unknown, we estimate it from comparable caissons in the region.

The passed thinks where a passed is britain, it taken as the passed of

The section of the content of the local section of the vertical party.

The ty glope to trace to the design headwards in a second reports are the description of the contract of the description of the contract of the description of the de

sacarates wat reports was all youth as all will a

desire dayner do to total it

cols from water depth charts edcasives come no september was made.

8. Postscript

This collection of charts is based on reports of the damage status of breakwaters, etc., but we are still afraid that there are some inaccuracies since a considerable amount of time may have passed after the damage and reports from local officials could not be adequately understood.

We have taken this into consideration and tried to strive for accuracy but at the same time ask for your indulgence when errors are found.

Our data may be used in analyzing examples of damage and in improving design techniques, but there are few results of observations with instruments for recording waves at time of damage and other natural conditions. Few of the causes of damage can be studied directly. Not only must we study natural conditions at the time of damage when analyzing damage to breakwaters but also grasp the stages of damage. These cannot be incorporated in the charts. It is also essential to grasp in detail various conditions when investigating specific examples of damage.

We would like to express thanks to the Hokkaido Development Bureau, the various Port and Harbor Bureaus, administration of ports and harbors, the Ministry of Transport District Port Construction Bureaus, and to the Disaster Prevention Bureau. They provided much of the data and shared in the publication. Help was also received from Dr. Tanaka, head of the floating sand laboratory of the Institute for Technical Research of Ports and Harbors, Dr. Sasaki, formerly with the Institute, Dr. Goda of the Wave Research Institute, and to Mr. Kinto of the Design Standards Section.

Literature Cited

- Kitashima, Shoichi, Takuji Nakano, Shushin Horii, Shusaku Kakisaki, Kenichi Oribata, and Yoshio Hanagi. "Collection of Charts on Damaged Breakwaters" (<u>Hisai Bohatei Shuran</u>). Institute for Technical Research of Ports and Harbors, Report No. 58, 1968.
- Institute for Technical Research of Ports and Harbors: "Tables on Building Materials for Ports and Harbors" (Kowan Kozobutsu Shuran).
- General Development Office, Fuji Marine District, Shizuoka-ken: "Tagonouda Harbor," 1968.
- 4. Meteorological Agency: "Weather Charts."
- 5. Meteorological Agency: "Published Atmospheric Charts" (Kishoyoran).
- 6. Meteorological Society: "Rapid Reporting Atmospheric Charts" (Sokuho Tenkizu).

Appendix: Trends in Damage to Breakwaters

Waves, tsunamis, flooding, earthquakes, etc. are cited as causes of damage to breakwaters. The sections receiving damage differ too.

We are trying here to comprehend the trends in damage by looking at meteorological elements involved in damage, what sections are damaged, etc.

1. Data Gathering and Methods of Analysis

We have assembled in this article data on 900 facilities, as shown as far as possible in Table 1 (Appendix), damaged in the period 1965-1972, and attempted to break them down according to meteorological elements and sections damaged. This does not include facilities being constructed.

2. Analysis by Damaged Section

Table 2 (Appendix) lists number of damaged sections by year to clarify the many sections damaged according to construction method of the breakwater, etc. The damage is shown with the following symbols:

- : Movement of caisson (when caissons moved irregularities were noted in other parts as well, but in this case that is included in the movement of the caisson).
- Destruction of riprap (riprap, irregular blocks in foundation works, overlay, and consolidation works) and superstructure.
- ②: Destruction of riprap (vertical part excluding foundation works, overlay, superstructure, wave-breakers, etc.) and superstructure.
 - O: Dispersion of riprap, etc.
 - Ot: Destruction of superstructure.
 - Destruction of main levee body.
 - Destruction of superstructure and main body.
 - : Dispersion of wave dissipation works.
- Ø: Movement, falling over, and dispersion of vertical parts of block levees, cellular block levees, in-site placed concrete levees.
 - 1: Sinking and dispersion of riprap, riprap block breakwaters.

Those of continuous rubble and hollow rubble as in a riprap-type sloping breakwater are shown in parentheses.

In addition to direct wave damage resulting in damage to breakwaters the frontal basin may be scoured and the damaged part may often extend gradually from the foundation mound to the main levee body. What is presumed to be this type of damage, that is, erosion by scouring, is shown in parentheses.

3. Analysis of Meteorological Elements

Various types of meteorological elements cause damage to breakwaters. Of these the most important are typhoons, low pressure systems, winter wind waves, and flooding from heavy rains. Here comparisons are made between date when damaged occurred as noted in records on restoration of damage and meteorological tables published by the Meteorological Agency, weather charts, and rapid forecast charts of the Meteorological Society of Japan. These are summarized from these various weather sources by damage element and analyzed for correlations between amount of damage as reflected in cost of restoration, number of damaged facilities, location of damaged harbor and meteorological element, with reference to path and size of the meteorological element that caused the damage.

4. Number of Damaged Facilities Broken Down by Damage Element

These are summarized in Table 3 (Appendix) to show number of harbors damaged by meteorological elements, number of damaged facilities, and estimated cost of restoration in three categories, less than 10,000,000 yen, 10-30,000,000 yen, and more than 30,000,000 yen. Date of the typhoon, low, flooding rains, etc., is entered, but seasonal factors such as winter wind waves are not related to the date and have been entered for a one year period. This same reasoning as the designation of damage elements applies to the distinction between lows and winter wind waves in 3. (1). b).

5. Location of Damaged Harbors Broken Down by Meteorological Elements

Appended figures 1-18 show which part of the harbors were most severely damaged, using data on path and size of the center of the storm which caused the particular damage to the breakwaters. Location of damaged harbors was recorded for all of Japan by typhoon, low, etc., which were presumed to be the damaging element. The following items entered into the preparation of these figures.

a) The path of the center of the typhoon or low is usually shown on the maps by solid or dashed lines. The arrow at the end shows the direction of advance.

Encircled numbers on the line of the storm path show the location of the center on that day as of 9:00.

With typhoons, etc., the larger encircled number with an arrow pointing to the path shows the sequence of development for convenience in using a single map for several storms.

- b) Full and empty circles which indicate harbor locations on the maps distinguish the meteorological elements involved where this can be determined. These are shown in the explanatory section above the maps. Full and empty triangles have the following significance:
- A: Mostly winter wind waves but may involve several low pressure systems.
- ▲: Flooding due to winter waves or to heavy rains. This includes one facility damaged by an earthquake.

Harbor names with a number alongside are those where restoration cost exceeded 10 million yen. When damage was less than this no number is given.

Names of harbors enclosed in a box with a single line are those which have facilities recorded in the charts and tables. Those with a double lined box were in construction when damaged.

- c) The date is the day when the actual damage occurred.
- d) The name of the element is that of the damage-inflicting meteorological element which is indicated by the path of the typhoon, low, etc.
- e) The time of day and lowest pressure reading are given for 3:00, 9:00, 15:00, or 21:00 for the meteorological element in that particular region. This is not restricted to the lowest reading in the region for the typhoons and lows, but the authors determined that the effect on causing damage to harbors was small outside of this region and entered those within the region on these maps.

When identical lowest pressure readings were recorded in the region of this map two or more times, we entered the day and hour nearest to the mainland.

| 北 防44歲 提 プロック式混成場 6/ | 42.11. 9~11 | 大12~图1 | ・上部工政権、当政治石、模倣プログリカル |
|------------------------|-----------------|-----------------|--------------------------------------|
| 西港東防波堤 ケーソン式機成堤 60 | 46. 9. 11 ~ 13 | #I# 63 | ケーのタン容動。(基礎情石散乱 88 |
| | 47. 2.14 | MI# 63 | ・ナーソン容動の基礎抽石数量 88 |
| 南 防光波 堤 | 47. 2.28 | B19 67 | - ナーリン 上部工政権 89 |
| 西 1547波 埃 | 41. 10. 28 - 30 | 18 37 68 ns | ケーソン移動、上部工験線。被覆石。象 関プロック数点。 40 |
| • • • • | 44. 2. 6 | 18 37 68 L: | ケーソン移動、上部工政権、主義協高。 被権石、機関プロック教徒。1 |
| 北 防4/故 美 , : … 1 | 40.12.16 - 17 | 18 40. 11: 2269 | クーソン移動、被覆テトラポッド、基準 捨石、根因プロック散乱、92 |
| 北 的41枚 类 | 44. 2. 5~ 6 | 88 48.40. 670 | ケーソン移動、上部工破壊、被覆テトリポット、基数拾石、機関プロック散進! |
| 南 筋化液 堤 ケーソン式直立堤 62 | 40. 2. 21 | *5 7/ | ケーソン気料タは新工鉄線、基礎工業線 |
| 南 助46被 美 ケーソン式混成場 60 | 40. 12. 17 | 18 15 7:2 ··· | 被覆石。基礎拾石數是 95 |
| 西防拔棄 (A部) | 41. 3: 5~ 6 | 图40.11.73 | ケーソン、上部工改造、前肢テトラボッド数点。 |
| 西 的47款 奖 | 44. 2. 5- 6 | EB 40. 11. 73 | ゲーソン多数破壊97 |
| 西 8047世 地 | 42. 9. 22 - 20 | TB 38 66 | 被表石、基製油石の製造プロック製品 |
| 東雅藝物故境 | 45. ° £. 31 | B4474 | 被復石、基礎捨石の機関プロック製品 |
| 北 的代表 吳 ブロック式温成堤 6/ | 41. 1. 19 ~ 24 | 昭37(英復旧》 | 明後テトラポッドの数点 100 |
| 西 的代7数 提 场所打=>/957大混成堤 | 41. 1. 19 ~ 20 | 图 38.71.576 | 本体を動化す、被覆石、基礎地石、機能プロック数点 101 |
| 西 助47歳 美 ケーソン式温成性をつ | 45. 1. 31 | B 43.12.477 | ケーソン参数化下破損。兼原石飲息 |
| 銀 節 被 後 ブロック式環成長 61 | 47. 12. 1~ 2 | B 28~39478 | 本件プロック数点。上部工程集103 |
| 西 助りた 袋 ケーソン大阪収集 60・ | 43. 1.14~16 | *I+ 63 · | ケーツン参加、被技石、機関プロック製魚 |
| 油川港区京防按提 , | 42. 10. 28 | #I+63 · | ケーソン多動。被覆石数型 105 |

| | 44. 2. 5~ 6 | 88 48 90 670 | ケーソン移動、上部工被線、被覆テト ポッド、基数拾石、機関ブロック数量 | 5.0 (.8 %) | +0.4 | -8.3 |
|--------|----------------|--------------|--|-------------|--------|--------|
| ¥ 62 | 40. 2.21 | *5 7/ | ケーソン信仰の仕事工政権、基礎工業庫 | 15:4(57) | +0.1 | -11.9 |
| # 60 | 40.12.17 | B1572 ** | 被覆石。 基礎地石飲品 95 | 40 (8,14) | (+0.4) | -7.4 |
| 1 | 41. 3: 5~ 1 | 图40.11.73 | ケーソン、上部工装造、前肢テトラポット製造。 | (大学) (大学) | +0.7 | -5.2 |
| | 44. 2. 5 ~ 6 | E 40. 11. 73 | ゲーソン等数数集97 | 52 (SA) | +0.4 | -1 1.0 |
| , fo 1 | 42 18 12 ~ 26 | 18 38 66 ·· | 被覆石、基礎地石の機関プロック物点 | 10 (P. 11) | +0.9 | 1 5.0 |
| | 45.0 £ 31' | B4474 | 被覆石: 基党地石の機関プロック製成 | 80 : (RR) | +0.9 | -11.0 |
| # 61_ | 41. 1.10~24 | 昭37(英俊旧) | 明後ナトラボッドの数点 100 | 43 | +.0.5 | -7.0 |
| 为大选成类 | 41. 1. 19 ~ 20 | 图 38年1.576 | 本体等曲次下、被製石、基礎抽石、機構 プロック数乱 101 | 58 (89) | +0.8 | -8.0 |
| E 20 | 45. 1. 31 | B 43.12.477 | ケーソン等動性下数拠。兼原石飲息 | 3.9:54 | +0.8 | -9.0 |
| £ 61. | 47. 12. 1~ 2 | B28~394B | 本体プロック教皇。上部工教法 103 | max · (日明) | +0.6 | -6.5 |
| # 60· | 43. 1.14~16 | #I+ 63 · | ナーツン参加、被技石、機関プロック製造 | 40 1(5/1) | (+0.6) | -7.0 |
| | 42. 10. 28 | #I+63 · | ケーフン多数、被長石数単 105 | 25 (87) | +0.8 | -5.2 |
| | 42. 9. 21 ~ 22 | 1838 66 | 7-17×80 106 | 45 (88) | +0.9 | -10.0 |
| | 45. 7. 6 | #I+63 | ケーソン多数意思、情故テトラポッド、 被覆石数点 ノクブ | 43 (137) | +1.5 | -7.2 |

Table 1. Summary of damaged facilities.

AND THE SE

BARK SWARE

TOPE COMPLETE

. 88

. 18

There I was an

.wipoid attidantion mo

bearboald adopt of

Contrario age agings 1 Caci

terraphies and forestalica therak.

Key:

43.

East breakwater

Number Name of harbor 3. Name of facility Type of construction 5. Date damaged 6. Date completed 7. Main damage Wave height H 1/3 9. Tidal level 10. Established water depth 11. Crown height Crown height of lower vertical part 12. 13. Crown height of riprap, etc. 14. Slope of harbor floor Water sinking weight of caisson breakwater 15. 16. Monbetsu 17. Abashiri Kushiro 18. Tokachi 19. 20. Kutsugata 21. Teuri 22. Yagishiri 23. Rumoi 24. Yoichi 25. Iwanai Hakodate 26. 27. Niigata 28. Ryotsu 29. Kashiwazaki 30. Himekawa 31. Wajima 32. Kanazawa Acmoria to reterought draw pointing would no retologned, remains 33. 34. Shiriyamisaki .. but encreasing the problem of the confidence 35. Hachinohe Miyako . vadamo to mesto squit has enucounterpous to no constant 36. 37. reserved de selfasto bon rector tere. Nakanosakumatahana to malamagaa, asatasiisasagaa la malamusiasi 38. 39. Onahama Shima breakwater a totandeed to detachqueb accorded and and 40. North breakwater (Cho) actual so than appropriate the measurestand 41. 42. North breakwater (Me)

North breakwater and . Doyonant managed are me . galfalia consist West harbor east breakwater has require sixeld and the longer

```
46.
    South breakwater.
    West breakwater
48.
    West breakwater (A part)
49.
    East harbor west breakwater
50.
    No. 1 breakwater
51.
    Yugawa east breakwater
52.
     Breakwater
53.
     Kawaraki east breakwater
54.
     Idesaki breakwater
55.
    Offshore breakwater
                                              The section is not I
    No. 1 West breakwater
56.
57.
    No. 2 West breakwater
    Caisson composite breakwater
58.
    In site poured concrete breaksater
59.
60.
    Caisson composite breakwater
    Caisson type vertical wall breakwater

Being constructed
61.
62.
63.
    Being constructed
    1940's
64.
    Early 1920's to 1930
65.
66.
66a. 1923-1936
    1944
67.
    1962
68.
69.
    22 Nov. 1965
70.
    10 June 1966
71.
    1916
                                                             Total T
    1940
72.
73.
    Nov. 1965
74.
    1969
75.
    1963 (damage restoration)
76.
    5 Nov. 1963
77.
    4 Dec. 1968
    1953-1964
78.
79.
    Sept. 1970
    25 Mar. 1971
80.
    25 Mar. 1967
81.
    25 Mar. 1968
82.
83.
    Caisson, consolidation block shifting with dispersion of overlay
    tetrapods and foundation mound.
84.
    Destruction of superstructure and ...
85.
    Destruction of superstructure and dispersion of overlay.
86.
    Destruction and cracking of caissons.
87.
    Destruction of superstructure, dispersion of foundation mound and
    consolidation blocks.
    Shifting of caissons, dispersion of foundation mound
89.
    Destruction of superstructure and caissons
90.
    Caisson shifting, superstructure destroyed, overlay, consolidation
    blocks dispersed
```

consolidation blocks dispersed.

Caisson shifting, superstructure destroyed, foundation mound, overlay,

THE PARTY TORREST TORREST TEST TEST TEST

- 92. Caisson shifting, dispersion of overlay tetrapods, foundation mound, and consolidation blocks.
- 93. Caisson shifting, superstructure destroyed, overlay tetrapods, foundation mound, and consolidation blocks dispersed.
- 94. Tilting of caissons, superstructure destroyed, foundation works destroyed.
- 95. Dispersion of overlay and foundation mound.
- 96. Caissons and superstructure destroyed, wave dissipating tetrapods dispersed.
- 97. Shift and damage to caissons.
- 98. Dispersion of overlay, foundation mound, and consolidation blocks.
- 99. Same as 98.
- 100. Dispersion of wave dissipating tetrapods
- 101. Shift and sinking of levee body, dispersion of overlay, foundation mound, consolidation blocks.
- 102. Shift, sinking, damage to caissons, dispersion of overlay.
- 103. Dispersion of main blocks, superstructure destroyed.
- 104. Caisson shifting, dispersion of overlay and consolidation blocks.
- 105. Caisson shifting, dispersion of overlay.
- 106. Caisson shifting.
- 107. Shifting and cracking of caissons, dispersion of overlay and wave dissipating tetrapods.
- 108. Shifting and cracking of caissons
- 109. Caisson shifting cracking of superstructure
- 110. Caisson shifting, dispersion of overlay tetrapods and foundation mound.
- 111. Dispersion of wave dissipating hollow triangular blocks.
- 112. Shifting and damage to caissons, dispersion of overlay (hollow triangular blocks, blocks, riprap) and foundation mound.
- 113. Caisson shifting, dispersion of overlay and foundation mound.
- 114. Visually measured
- 115. Estimated
- 116. Actual measurement
- 117. Unknown

116.2

| 1 | 2 8 | 1 N 10 4 | 柳遊林式 | 被災年月日 | 完成年月日 | 主な被災状況 | 被高 |
|---|--------------|--------------|--------------------|-----------------|----------------------|---|-----------|
| | 小路员 | 旗 2 西防被换 | ケーソン式混成幾 68 | 47. 1.11 ~ 13 | #IP 76 | ケーソン沈下、基礎旅石、根間ブロック 散乱 102 | 68 |
| | #17 A | 外港地区外防放堤的 | • | 47. 1.12 | 昭 48: 12.577 | ケーソン移動、被復コンクリートプロック、基礎治行、根因プロックを乱 103 | 7.0 |
| 9 | • | • (3) | • | 47. 1.12 | BI# 76 | • | 7.0 |
| | | . 80 | | 47. 12. 24 | 施工中 76 | ケーソン移動。被優ガンマエル。基礎輸石散乱 | 7.0 |
| • | m 18 m | * 54 # | ケーソン式提成後 68 | 47. 1.11~12 | 昭 46. 12. 2578 | ケーソン移動、被覆石、基礎捨石、美國プロック教風 | 2.0 |
| • | B/9 # | 外籍的放弃 | | 40. 9.17 ~ 18 | 58 40. 3. 25/9 | ケーソン移動な下 前肢ケンラボッド酸 | 54 |
| • | • | 外港東防放機 | | 40. 9.17 ~ 18 | 昭 36. 3.2580 | ケーソン移動。消波デルラボット散乱 | 5.4 |
| • | +28 × | 防 47数 类 | | 42. 10. 27 ~ 28 | FB 39. 3. 2561 | ケーソン多動は下。被後石、基礎地石 飲乱 | 不明 |
| • | 田子?请 | 西 时48亩 块 | = + + + + + - 7:69 | 40. 9.17 | FB 36. 5. 1162 | ニューマテックケーツン前面に傾斜った | 9.2 |
| 0 | #22ª | 東 海49龍 幾 | プロック式提成後 6% | 47. 9.16~17 | 昭 34. 3. 25月3 | 本体プロック領針、模国ラレラボット教皇 | 5.6 |
| 0 | 英22名 | | 拾石式傾斜幾 70 | 47. 9.16 | 昭 47. 3. 2559 | 病数テヤラポッド。上部コンクリートア ロッが数乱 1// | 5.6 |
| 0 | 四点市 | 地 助50数 装 | ケーソン女性政策 68 | 47. 9.16 | 昭 38. 3. 15 | ケーバン参覧。上部工設長 1(2 | 3.5 |
| 0 | B247 | 南 防5/被 接 | 場所打コンクリフム 式提成場 | 45. 7. 5~ 6 | FE 38. 3.25% | 本体。上部工业组、被视石效乱 [13 | 19 |
| • | るとなる | 加部地区東防被操 | プロック式造成後 68~ | 44. 2. 5~ 6 | 88 41. 3. 25 67 | 被数テトラボッド沈下飲品、本体プロックにあるか 114 | 2.6 |
| • | *26 | 外海地区防放装 | | 45. 8.21 | 图5 : 88 | 一本体プロック参加化下、被侵石、基礎指 石散乱 IIS | 20 |
| 0 | TE 27 # | 類田地区等教徒 | 拾ブロック式領新提 72 | 40. 7. 23 | #35. 3.31 9 9 | テトラボッド提供下数数 116 | 8* |
| • | # 28 m | 西 - 1548 数 章 | セルラープロック式温度量 | 46. 1. 4 | 18 45. 3. 2590 | 上部工、本体セルラーブロック倒線、装装テトラボット製造。 (17 | 2.0 |
| • | | | | 46. 1. 4 | 16 45. 3. 2590 | 上部工、本体セルラーブラック製造 | 8.0 |
| | 和歌山 24 下章 | 南海外防放果 | ケーソン式温成装 68 | 46. 8.30 | *I 76 | ケーソン進製、装飾石、基礎捨石、機器 プロック飲品 | 2.6 |
| • | 野物性 | 北 防56数 級 | プロック式造成後 68~ | 43. 7. 28 | 8 10. 3. 207(| 被復石、基礎捨石、模個プロック教皇 | 13 |
| • | 43/ # | 東 奶57数 袋 | | 45. 8.21 | 大3~图9亿 | 本体プロック、上部工転倒。被吸石、基 機械石軟乱 (2) | u |
| • | 第32 章 | 极免的57防放弃 | ケーソン武器政権 68 | 45. 8. 21 | 18 44. 6. 1293 | 務故中空三角プロック数起 122 | 45 |
| 6 | A33 H | 双名 篇 初 被 接 | 場所打コンクリスト 女後成後 | 45. 8. 21 | 本 明 94 | 機關石教成 123 | 50 |
| 9 | • | 章 田 西 防 故 奏 | 地石式组织地 74 | 45. 8.21 | 不明 94 | 本体練石、機固捨石散乱 124 | 5.0 |
| • | 干艺加工 | 新 / 雅 的 放 雅 | MAN 75 | 45. 8. 21 | 图20年代95 | 模閣拾石散乱 125 | 8.0 |
| | T35® | # 11 th # # | 治プロック式領外後 72 | 45. 8. 21 | 88 40 96 | テトラボッド提供下数数 126 | 5.0 |
| • | ** | 京港地区西防政策 | ケーソン式温泉後 68 | 43. 2.15 | #I# 76 | +-7×8# 127 | T9 |
| • | 37 | 北 助56数 粮 | | 45. 8.14 | 不明 94 | サーソン等外化下 (28 | 45 |
| • | EXH | | 抽ブロック式機能後 72 | 46. 8. 30 | 图 45. 3. 3197 | テトラボッド提比下数点 129 | 4.0 |
| • | 8 A P | 中 場65元 雅 | | 46. 8. 5 | 18 46. 3.31% | テトラポッド後先下数点 129 | 4.0 |
| 0 | • | 北 湖谷 | | 46. 8. 5 | 18 44. 3.31 97 | テトラボッド機能下鉄ル 129 | 40 |
| e | 11140 PS | 神 创 堆 | プロック式提成後 694 | 44. 6.28 ~ 7.7 | B44. 3 100 | 務故(根據)六阿ブロック飲品[30 | |
| 4 | 果纠生 | 助 47数 獎 | 物プロック式機料機 72 | 43. 9. 24 | 图 43. 3. [0] | 大脚プロック操作下敗乱 131 | 3.0 |

| 5 被災年月日 | 完成年月日 | 主な被災状況 | 被高H1/3 | 朝世 | 放作 | 美海 | 直立配 下端高 | 松石等 天路高 | 梅族 | ケーテン境の水投す品 |
|-----------------|---|---|--|-------------------------------------|---|---------------------------|---|--|-------------|--|
| 47. 1.11 ~ 13 | *IP 76 | ケーソン化下、基礎情石、模閣プロック 数点 /02 | 68 (実例)? | +1.3 | -16.0 | +25 | -11.5 | -100 | 250 | 2505 |
| 47. 1. 12 | 昭 46: 12.5 77 | ケーソン移動、被覆コンクリートプロッ | | | -155 | +5.0 | -10.0 | -8.5 | 100 | 263.7 |
| 47. 1 12 | BIP 76 | · + + + + + + + + + + + + + + + + + + + | | | -19.0 | +5.0 | -14.0 | -125 | 100 | 333.4 |
| 47. 12. 24 | #IP 76 | ケーソン移動、被極ガンマエル。高機輸石散乱 | 7.0 (推定分 | +1.2 | -21.0 | +3.8 | -14.0 | -9.7 | 150 | 307.6 |
| 47. 1 11 ~ 12 | 58 46. 12. 2578 | ケーソン移動、被機石、基礎捨石、製器プロック数乱 | max (8m9 | +1.4 | -10.0 | +4.0 | 6.0 | -4.8 | 20 | 99.2 |
| 40. 9.17 ~ 18 | 58 40. 3.25/9 | ケーソン移動式下 横破ケトラボッド教 | 54 (AM) | +1.9 | -7.6 | +4.6 | -4.0 | +1.0 | 40 | 62.4 |
| 40. 9.17~18 | FR 36. 3.2500 | ケーソン移動。消波テルタポット散乱 | 54 (美國) | +1.9 | -4.5 | +3.0 | -3.0 | +1.0 | 30 | 34.0 |
| 42. 10. 27 ~ 28 | 图 39. 3. 256/ | ケーソンを動化下。後後石、基礎地石 飲品 | 不明 94 | (+1.7) | -9.0 | +4.8 | -50 | -4.0 | 20 | 64.6 |
| 40. 9.17 | EB 36. 5. 1162 | ニュアマテックケーツン前面に傾斜って | 9.2 | +2.0 | -12.0 | +3.0 | -185 | 4 | 10 | |
| 47. 9.16~17 | 图34: 3.25[3 | 本体プロック傾斜。模型ラトラポッド放乱 | 5.6 | +1.8 | -3.5 | +3.1 | ±0.0 | +0.5 | 80 | - |
| 47. 9.16 | 昭 47. 3. 25 6 9 | 務数テヤラボッド、上部コンクリートプ ロッダ数乱 1// | 5.6 | +1.8 | -6.5 | +5.0 | - | +5.0 | 80 | : - |
| 47. 9.16 | 18 38 3. AS | ケーパン参助、上部工改換 1(2 | 3.5 (推定%) | +4.2 | -9.0 | +7.0 | -6.3 | -5.3 | 200 | * 88.5 |
| 45. 7. 5~ 6 | 63 38. 3. 25% | 本体。上部工业型、被视石数乱113 | MAX (8 M/) | +2.1 | -4.0 | + 3.5 | 4不明 | ±op | 50 | 5 |
| 44. 2. 5~ 6 | 88 41. 3. 2567 | 被数テトラポッド改下数点、本体プロックに呼るみ 114 | max (実際/3 | +0.6 | -7.0 | +2.2 | -5.7 | -3.3 | 70 | |
| 45. 8. 21 | BS : 88 | 一本体プロック参加化下、被後石、基礎指 | max (8 m 47 | +0.4 | -4.0 | +1.5 | -1.0 | -0.2 | 20 | |
| 40. 7. 23 | FB 35. 3. 3150 | ナトラボナド提供下鉄風 116 | A STATE OF THE PARTY OF THE PAR | - | -10.0 | +1.0 - | - | +1.0 | - | _£ £ |
| 46. 1. 4 | B 45 3. 2590 | 上部工、本体セルラーブロック倒壊。 構 接テトラポッド数点。 ハフ | 8.0 | +1.1 | -12.0 | +4.2 | -8.0 | +5.2 | 100 | д — ў |
| 46. 1. 4 | B 45 3 2590 | 上部工、本体セルラープアンク側を | 8.0 | +1.1 | -18.0 | +4.2 | -14.0 | -125 | 100 | 1 2 |
| 46. 8.30 | 11 76 | ケーソン亀製、被領石、基礎捨石、機器 | 26 (美術) | +1.8 | -10.6 | +4.3 | -6.0 | -4.0 . | 140 | 121.6 |
| 43. 7. 28 | 图 10. 3. 207 | 被優石、基礎捨石、模型プログラ製品 | 7 | +2.9 | -2.5 | +3.5 | -1.0 | +0.4 | 20 | - |
| 45. 8.21 | 大3~图9亿 | 本体プロック、上部工転倒、被覆石、基礎格石数点 | 3.5 | +2.8 | -1 3.5 | +5.0 | -4.4 | -2.8 | 100 | |
| 45. 8. 21 | E 44. 6. 1293 | ************************************** | 45 (88) | +3.5 | -10.0 | +3.4 | - 否明 | +3.4 | 30 | g本 明 |
| 45. 8. 21 | 不明 94 | 機関石製品 (23 | 50 (BE) | +4.1 | -1.5 | +3.0 | -1.5 | +1.5 | 50 | - |
| 45. 8.21 | 不明 94 | 本体執石、模圖拾石散乱 124 | 50 (推定)2 | +4.1 | -1.8 | +4.2 | - | +0.5 | 100 | - |
| 45. 8. 21 | 昭20年代95 | 機關接石數品 125 | STATE OF THE PERSON NAMED IN | and the local division in which the | -4.0 | +5.6 | 不夠 | +3.0 | 10 | - |
| 45. 8. 21 | 图40 96 | テトラボッド機化下数元 126 | 50 (推定) | +2.9 | -10.0 | +3.5 | 77 | +3.5 | 100 | - |
| 43. 2.15 | BI+ 76 | 7-7×80 127 | The second second | 1, | -9.0 | +1.6 | -5.0 | -4.6 | 200 | 41.4 |
| 45. 8.14 | 不明 94 | | 45 (88) | +3.4 | -14.0 | +5.5 | -6.7 | -6.7 | 50 | 117.7 |
| 46. 8. 30 | 昭 45. 3.3197 | テトラポット提比下数点 129 | 44 | +23 | -4.5 | +3.0 | - | +3.0 | 30 | - |
| 46. 8. 5 | 图 46. 3.31% | テトラボッド級化下数点 129 | 4.0 | +3.6 | -3.5 | +3.0 | - | +3.0 | 70 | - |
| 46. 8. 5 | 图 44. 3.3197 | テトラボッド機比下数型 129 | 44, | +3.6 | -3.5 | +3.0 | - | +3.0 | | - |
| 44. 6.28 -7.7 | E 44. 2 /00 | 務後(根限)六脚プロック数乱130 | 日本による改集 | - | ±0.0 | +5.0 | -1.0 | +4.0 | কুল | - |
| | | | Control of the Contro | THE RESERVE OF SALES | CONTRACTOR OF THE PARTY OF THE | Marie Charles Street Land | AND DESCRIPTION OF THE PERSON | The state of the s | | Married Co. Co., Springer, |
| | 47. 1.11 ~ 13 47. 1.12 47. 1.12 47. 1.12 47. 12.24 47. 1.11 ~ 12 40. 9.17 ~ 18 42.10.27 ~ 28 40. 9.17 47. 9.16 ~ 17 47. 9.16 48. 7. 5 ~ 6 44. 2. 5 ~ 6 45. 8.21 40. 7.23 46. 1. 4 46. 8.30 43. 7.28 45. 8.21 | 被災年月日 完成年月日 47. 1.11~13 | 接来年月日 完成年月日 主女 養 製 表 表 表 表 表 子 一 ア - ア - ア - ア - ア - ア - ア - ア - ア - ア | 47. 1.11~13 | 47. 1.11~13 | | | | 元代 111 - 13 | 表示 1 1 1 1 - 1 |

-1.2 mil 1 1

表一1 集覧对象指設一覧表

Table 1. Summary of damaged facilities (continued).

Key: Keyed as in preceding part of Table 1. - North training feres Onahama Kashima 17. 18. Atami 19. Numazu 20. Ukusu 21. Tagonouda 22. Hamana 23. Yokkaichi Shiriko 24. aspel selecte cargin 25. Tottori 26. Sakai hetouthamb mains 27. Etsu 28. Hamada 29. Wakayama no Shimozu 30. Hiwasa 31. Imabari 32. Murotsu 1001 CHEST THE 33. Kurei 34. Kaminogae 35. Shimoda 36. Karatsu Wakizaki 37. Nobeoka 38. 39. Miyazaki GP TE . TEN SE Sendai 40. DEED LINE OF Kurio 41. 230 . 121. 00 42. No. 2 west breakwater 1914-1914 Outer harbor outer breakwater (H), (J), (K) 43. 12 Augus 1960 44. East breakwater 5,40 45. Outer harbor west breakwater "由人也是包生 Outer harbor east breakwater 46. 30 Breakwater GIRT . TAN IE West breakwater Mar-was M. 49. East training levee MARI JOHN TE Asahi breakwater 50. 51. South breakwater Back Tack 52. Karo district east breakwater at he solarsonis accepted to gether 53. Outer harbor district breakwater 54. 1 Suda district training leves on to paymoneth conservation of gaintraid 55. South harbor outer breakwater and the model of the teamon been become 56. m North breakwater fammes very over to more seguit , another to get tief East breakwater spinsor . whitewe to soletanelt . annouse to garfilest Gomen No. 1 breakwater committeering blocks. 59. o Futanachima breakwater de eregett , speakker be grineta tot and take 60. Kamata west breakwater and same to suits what a socuetar to suffited

Stiffing and sinking of dalamana, dispersion of overlap and foundation

Kamagakubo breakwater Harbor entrance training levee 62. East harbor district west breakwater 63. 64. South training levee 65. Middle training levee 66. North training levee 67. Training levee 68. Caisson composite breakwater 68a. Block composite breakwater 69. Pneumatic caisson 70. Riprap sloping levee 71. In-site poured concrete composite breakwater 72. Block sloping levee Cellular block composite breakwater 73. Riprap sloping levee 74. 75. Composite breakwater 76. Being constructed 5 Dec. 1971 78. 25 Dec. 1971 79. 25 Mar. 1965 25 Mar. 1961 80. 81. 25 Mar. 1964 82. 11 May 1961 25 Mar. 1959 83. 25 Mar. 1972 84. Mar. 1963 85. 25 Mar. 1963 86. 25 Mar. 1966 87. 1930 88. 89. 31 Mar. 1960 90. 25 Mar. 1970 20 Mar. 1935 91. 1914-1934 92. 93. 12 June 1969 94. Not known testant bank bank utant telep 1940's 95. 96. 1965 97. 31 Mar. 1970 31 Mar. 1971 98. 31 Mar. 1969 99. Mar. 1969 100. Mar. 1968 101. Sinking of caissons, dispersion of foundation mound and consolidation 102. blocks. 103. Shifting of caissons, dispersion of overlay concrete blocks, foundation mound, and consolidation blocks. Shifting of caissons, dispersion of overlay gammal and foundation mound. 104. 105. Shifting of caissons, dispersion of overlay, foundation mound, and consolidation blocks.

Shifting of caissons, dispersion of wave-breaker tetrapods.

106. 107.

108.

mound.

Shifting and sinking of caissons, dispersion of wave-breaker tetrapods.

Shifting and sinking of caissons, dispersion of overlay and foundation

- 109. Sloping of front of pneumatic caissons.
- 110. Sloping of levee body blocks, dispersion of consolidation tetrapods.
- 111. Dispersion of wave-breaker tetrapods and superstructure concrete blocks.
- 112. Shifting of caissons, damage to superstructure.
- 113. Cracks in main body and superstructure, dispersion of overlay.
- 114. Sinking and dispersion of overlay tetrapods, loosening of main levee blocks.
- 115. Shifting and sinking of main levee blocks, dispersion of overlay and foundation mound.
- 116. Sinking and dispersion of tetrapod wall.
- 117. Toppling and damage to superstructure and main levee cellular blocks, dispersion of wave-breaker tetrapods.
- 118. Toppling and damage to superstructure and main levee cellular blocks.
- 119. Cracking of caissons, dispersion of overlay, foundation mound, and consolidation mound.
- 120. Dispersion of overlay, foundation mound, and consolidation blocks.
- 121. Toppling of main levee blocks and superstructure, dispersion of overlay and foundation mound.
- 122. Dispersion of wave-breaker hollow triangular blocks.
- 123. Dispersion of consolidation material.
- 124. Dispersion of main body.
- 125. Dispersion of consolidation riprap.
- 126. Sinking and dispersion of tetrapod wall.
- 127. Shifting of caissons.
- 128. Shifting and sinking of caissons.
- 129. Sinking and dispersion of tetrapod wall.
- 130. Dispersion of wave-breaker (consolidation) 6-legged blocks.
- 131. Sinking and dispersion of 6-legged block wall.
- 132. Actual measurement
- 133. Estimated
- 134. Visual measurement.
- 135. Eroded and scoured by flood waters.

2.3 .13

APPENDIX

Table 1 (appendix). Breakdown of number of damaged facilities.

Key:

- 1. Year (40 = 1965 to 47 = 1972)
- 2. Breakwaters
- 3. Training levees
- 4. Levees to hold sand
- 5. Jetties
- 6. Total

| # | 防波堤 | 導流堤 | 防型是 | 夹5块 | A- |
|----|-----|-----|-----|-----|-----|
| 40 | 224 | 21 | 10 | 4 | 259 |
| 41 | 52 | 14 | 4 | 1 | 71 |
| 42 | 41 | 6 | 5 | 4 | 56 |
| 43 | 81 | 7 | 2 | 4 | 94 |
| 44 | 29 | 6 | 2 | 2 | 39 |
| 45 | 185 | 18 | 2 | 7 | 212 |
| 46 | 70 | 16 | 5 | | 91 |
| 47 | 65 | 9. | 4. | | 78 |
| 21 | 747 | 97 | 34 | 22 | 900 |

Table 2 (appendix). Places damaged on breakwaters, etc.

Key:

- 1. Year (40 = 1965; 41 = 1966, continued on next page)
- 2. Place damaged
- 3. Upper levee body
- 4. Caisson type
- 5. Composite breakwater
- 6. Vertical-wall breakwater
- 7. Block type
- 8. In-site placed concrete type
- 9. Cellular block type breakwater
- 10. Riprap block sloping breakwater
- 11. Riprap type
- 12. Sloping levee
- 13. Piled stone
- 14. Other
- 15. Total
- 16. Go to next page
- 17. Eroded by scouring

| 1 | # 2× | 7- | ナン式 | 10 | ,力式 | 場所 | イコン | EN3- | 10 | * | // 5 式 | 14 | 15 H |
|------|-------|-----|-----|-----|-----|-----|------|-------------|------------|------|-----------|------|---------|
| 年次 | 筒所 | 異族是 | 直立堤 | 選成是 | 直立堤 | 遊戲題 | 直至地 | プロック式 遊 成 堤 | ック式 傾斜堤 | 神智葉 | (右横) | その他 | at the |
| | • | 8 | | | | | | | | | | | |
| | • | 6 | | 3 | | 3 | | | | | | 12 , | 1 |
| | 0 | | | 2 | | 1 | | 1 | | | | | 1.00 |
| | 0 | 18 | | 20 | | 27 | | 2 | | | | | 61 |
| | 03 | 2 | 2 | 1 | | | | | | | | | ı, |
| 40 | 0* | | | | | 1 | 4 | | | | | 1 | |
| 1965 | 0±3 | 1 | | | | 2 | 4 | | | | | | |
| -,-, | 08880 | 2 | | | | 1 | | | | | | | |
| | 8 | | | 5 | | | | | | | | 1 | |
| | 0,7 | | | | | | | | 11 | 129 | (60) | | 140 |
| | (洗塩) | (4) | | (1) | | (9) | (4) | 12239 | (5) | (36) | (23) | (2) | (61) |
| | 81 | 37 | 2 | 31 | 0 | 35 | 8 | 3 | 11 | 129 | (60) | 3 | 259 |
| 4111 | | | | | | * | ~ 76 | 化粒 4 | | | | | |

表一附.2 防波姿等の被災箇所 Table 2 (appendix).

- 232-

| # 次 | 被災 | | 4 | | 7,式 | 場所 | 175 × | 9 セルラー ブロック式 起 成 提 | 10 第プロ サナス 傾斜堤 | 124 | 石 式 | 14 その他 | 15 |
|------------|---------------------------------------|-----|-----|-----|-----|-----|-------|-----------------------------|-------------------------|--------------|------|--------|------|
| | 簡所 | 影成集 | 电影路 | 混成堤 | 順立権 | 製成堆 | 政立理 | 遊成堤 | 梅料堤 | 网络建 | (右前) | 401B | 1 11 |
| | • | 4 | | | | 1 | | | | | | | 5 |
| | | 1 | | 3 | | 1 | | | | | | | 5 |
| | 0 | 3 | | 2 | | 8 | | 3 | | | | | 16 |
| | 8 4.8 0 0 | 3 | • | | | | | | | | | | |
| | 1 | 1 | | 2 | | | 1 | | | | | | 4 |
| 1966 | 1 | 3 | | | | | | | | | | | 3 |
| | | | | 1 | • | 1 | 2 | | | | | 1 | |
| | €,4 その他 | | | | | | | | 5 | 22 | (16) | | 27 |
| | (24) | (1) | | (1) | (1) | (4) | (3) | | (5) | (7) | (6) | (1) | (23) |
| | 21 | 15 | 0 | 8 | 1 | 11 | 3 | 3 | 5 | 22 | (16) | 3 | 71 |
| | • | 3 | | | | | | | | | (10) | • | 3 |
| | | 2 | | 2 | | 2 | | | | | | | |
| | 0 | | | | | 1 | | | | | | | 1 |
| 42 1967 | 0 | 5 | | 2 | | 16 | | | | | | 1 | 24 |
| | 05 0* | | | .1 | | | | | | | | | 1 |
| | | 1 | | | | 1 | 5 | | | | | | 7 |
| | 8 | | | 1 | | | 1 | | | | | | 2 |
| | (洗傷) | | | | | | | | 1 | 11 | (8) | | 12 |
| | /58H | (1) | | | 0 | (8) | (5) | | (1) | (8) | (8) | | (23) |
| | 0 | 3 | - | 12 | | 8 | 6 | 0 | 1 | 11 | (8) | _1_ | 56 |
| | | | | | | 1 | 1 | | | | | | 25 |
| | 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 | | | | | | 2 | | | | | | 3 |
| | のは | | | | | 1 | | | | | | | i |
| 43 | 4 | 4 | | 1 | | | | 1 | | and the | | | |
| 1968 | | | | 1 | | 3 | | | | | | | 4 |
| 1900 | その権 | | | | | | | | 7 | 46 | (38) | | 53 |
| | | | | | | | | | | | | 2 | 2 |
| | (洗明5 | (3) | | (4) | | (4) | | | (3) | (21) | (17) | (1) | (36) |
| | isat | 7 | 0 | 14 | 0 | 14 | 3 | - 1 | 7 | 46 | (38) | 2 | 94 |
| | 0 | | | 3 | | 5 | | | | | | | • |
| | OŁ. | 3 | | | | • | . 1 | | | | | | 12 |
| | | | | | | 2 | . 1 | | | | | | • |
| | O.E | | | | | | | | | | | | |
| 44 | 0 to | 1 | | 1 | | | | | | | | | : |
| 1969 | | | | 2 | | | | | | | | | • |
| | 04 | | | | | | | | , | | (2) | | |
| | 2019 | | | | | | | | | | | 2 | |
| | (AM) | (3) | (1) | (1) | | (4) | | | (1) | (2) | (1) | (2) | (14) |
| | 158t | 15 | 1 | 7 | • | 7 | 1 | • | 1 | • | (2) | 3 | 39 |
| 4512 | | | | | | * | 76 | : M < | | | | | |

表一階·2 防放提等の被災億所 Table 2 (appendix) (continued). 311

| 4 x | N ² X | | グン式 | | 7,* | 場所 | 14 | + N 3 - | 10 | 12 | 岩 太 | 14 七の他 | 15 |
|------|---|--------|--------------------|-----------------|------------|-----------------------|----------|----------|---------|-------|------------|--------|-------|
| + a | * * | 社成地 | 在立堤 | 遊戲是 | 直型地 | 遊戲地 | 如文章 | ブロック式製成装 | ック式 傾斜堤 | 城海 | (右截) | その他 | 1 1 |
| | • | , | 1 | | | 2 | | | | | | 20 | |
| | | 2 | | | | 1 | | 1. | | | 110 | 100 | |
| | 0 | 1 | | | | 2 | | | | | 10.00 | | |
| | 00000000 | 7 | | 10 | | 13 | | | | | | 1 | 3 |
| | 0 E | 1 | | | | 2 | 1 | | | | 17.25 | | |
| 45 | 0 | | | 1 de 1 de 1 | | 4 | | ner N | | | | 43.00 | 4.19 |
| | 07 | | | 1 | | 3 | | | | | | 1 | |
| 1970 | 4 | | | 2 | | 1 | | | | | | 12-01 | |
| | 8 | | | • | | 1 | | | | | の記事的 | 3579 | |
| | 20th | | | 1 1 1 | | | | | 8 | 133 | (104) | | 14 |
| | | | | | | 904 × 8 1 | | | | | 0.01 | 1 | |
| | (洗掘) | (6) | (1) | (3) | | (8) | | | (4) | (36) | (28) | (1) | (59 |
| 100 | /51H 17 | 16 | 1 | 21 | 0 | 29 | 1 | 0 | 8 | 133 | (104) | 3 | 21: |
| | • | 3 | | 8.70 (E.M.) | | | | | | | 1 | 1.0 | |
| | | 2 | | n, who an | | 2 | | | | | | | |
| | 0000000 | 3 | | • | | | - 110 | | | | 81 | 65-26 | |
| | O.L. | | | .7 8 4 pc | | 25.0 | 1,1 | | | | | | 11 |
| 46 | OF. | 1 | | | | 12.5 | | | | | | | |
| | * | | | 2 | | | | | | | | 016-65 | |
| 1971 | 8 | 11.19 | | 2 | | | 1 | 1 | | | 5 2 8 | 10000 | |
| | | | | | | | | | 12 | 39 | (20) | | 5 |
| | (mm) | | | DESE | (4) | | (1) | | (6) | (19) | (9) | 1 2272 | (26) |
| | 15th | 14 | 0 | 13 | 0 | 10 | 2 | 1 | 12 | 39 | (20) | 0 | |
| | • | • | | | | | | | | | | | |
| | • | 1 | | | | 1 T | 1 | | 0 | | no de la | | |
| | 0 | | | | | 2 | | | | | 2018年1月 | 14 | |
| | 0. | | | 48.4 | | 12 | | | | | | 7 7 6 | 15 |
| | 0 E | 4 | | • | | arings b arings by | 1 | 11 1 | | | | | |
| | 0* | 1 | 8 | C16,8528 | | 1 | 3 | | | | 1.45.3 | | 12 E |
| 47 | の与 | 90 1 B | 134 | Contraction, et | 106 106 | international | 1 | | 10 | | 5 1 | 1 00 | |
| 1972 | 4 | 0.00 | 963 516 | 4 | | 4 | | 1 1 | | | | 101-15 | |
| -,,~ | 8 | | | 2 | 2 | | | | | | | | |
| | 3 - 8 - 9 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | | | | | | 7.7 | 4 | 7 | (4) | | 11 |
| | その他 | | | | | | | | | | | 4 | |
| | (HM) | | 10 R (1 16 G/s) | (2) | (1) | (6) | STATE OF | 120 3 | (2) | (5) | (3) | (1) | (17) |
| | 1581 | 21 | 0 | 15 | 2 | 19 | 6 | 0 | 4 | 7 | (4) | 4 | 78 |
| 18 | 4 H | (18) | (2) | (12) | (2) | (43) | (13) | 2010年至 | (27) | (134) | (95) | (8) | (259 |
| , , | | 136 | 4 | 115 | 3 | 145 | 30 | 8 | 49 | 391 | (252) | 19 | 900 |

Table 2 (appendix) (continued). 表一附・2 筋波炎等の被災箇所

| 1 | 2 | 3 | 4 | 5 | 640200000 | | | 1 2 | | 3 | 4 | В | Япопинав. | | |
|------|----------|---------|----------|-----|-----------|------|------|-----|---------------|--|-------|------|-----------|----------|------|
| | A/0 | 雅問 本 | ** | M.R | 1900万 余湖 | | #W & | 2 | 19007 7 AM | 300 万 | | 9°05 | | | |
| | 1/8-10 | A R E | PA 24050 | 12 | 10 | | | 8 | | THEAT | 1 | 3 | 2 | | • |
| | 3/15 | 10 | 1 : | 1 : | ! | 1 | 1 | 43 | | # 16 H | 73 | 1 | 78 | | |
| | 0/20 | 411 . | 1 : | | | 1 | | - | 2/5~6 | ME SE FE | | 14 | 100 | - | |
| | 1/2 | * 12* | 2 | 2 | | | | | 3/13 | 10 E | ï | 1 | | 100 | |
| | 1/23 | | 1 | | | | 1 | | 6/28-7/7 | 12京南洪 木 | | 3 | | | 1 |
| | 8/5-7 | # 15 | 25 | 32 | 20 | • | | | 0/4 | # 11 7 | | 2 | 1 | | 1.27 |
| 40 | 9/10 | 11 | 1 .2 | 130 | 107 | 16 | , | 44 | 11/20 | ZEMA A | 1 | ! | 1 | | |
| 65 | 2/17-18 | 4 24 | 30 | 49 | 33 | 13 | | B | | 2. 多用风吹车 | | | | | |
| | 10-3-5 | # 28 | 2 | | | | | | | WES洪水 | 1 | 1 | | | |
| | 11/14-16 | " to | | , | | 3 | | | 215 | | 33 | 39 | 21 | 10 | |
| | 12/14-17 | 10 | | | | | | | 1/31 | " BE | 18 | 31 | 22 | , | |
| | 1115 | +ml2a | 157 | 250 | 201 | 41 | 17 | | 4/16 | 22884 | 1 | : | 2 | | |
| | 1/7 | KRE | 13 | 7 | - | - | 11 | | 2/4-6 | | 1 | 1 | 1 | | |
| | 2500 | 10 | 1 | | | | 1 | | 0/13-15 | # // : | 40 | 62 | 56 | | |
| | 2/19 | | | | | | | 45 | 8/20-21 | 4 - 10 | 59 | 105 | 80 | 15 | 10 |
| 5700 | 6/19 | * | 1 | • | | | | 70 | 9/18 | EN E | 1 | 1 | 1 | | |
| 50 | 6/50 | * 11. | | • | | | | | 11/10-11 | | | 3 | 2 | 1 | |
| | 8/23-24 | *** 15 | | | : | | 1 | | 12/13 | SAMME | : | | 1 | 1 | |
| 41 | 9/2 | *11 | 1 | | | 100 | | | 115 | Prana | 1 129 | 212 | 167 | 30 | 15 |
| | 9/24 | # 24 | | 15 | 14 | | | | 1/4 | & M E | • | 10 | | 3 | 2 |
| 4 | 9/24-25 | # 26 | | | | 1 | | | 1/10-17 | 10 | | • | 2 | | |
| No. | 10/20 | M FOE | • | | | 1 | 1 | | 4/29 | | 1 | 1 | | | |
| 2 | 12/20 | _13_ | | | | | 1 | | 00 1 | PREN A | | 1. | | | |
| | | +HARRA | " | 13 | | | | | 1/22 | 4 | 25 | 35 | 26 | | |
| | #15 | -34. | 50 | 71 | 50 | 11 | 10 | .46 | 8/20-9/2 | 1.//23 | 17 | 24 | 15 | 5 | |
| | 2/22-24 | | 3 | | 3 | - | 1 | 71 | 0/11-12 | # 1 26 | | | | | |
| | 1/1-0 | | | | | | | | 11/0 | 13 E | 1 | 1 | | | |
| 1.8. | 6/25-53 | # 11 10 | 2/2 | | | 2 | | | 12/3 | A CONTRACTOR OF THE PARTY OF TH | , | , | | | |
| - | 9/11-13 | | | | | .9.9 | 1 | | (| STREET, | • | • | 57 | State of | |
| 42 | 10,27-28 | 4 - 34 | | 22 | 18 | | | | 1/9~12 | & NOE | - | 13 | 37 | 20 | 14 |
| | 11/0-11 | | | • | | | | | 1/4 | 京南洪水 | | | De la | | - |
| 67 | 11/15 | 10 | | | | | 1 | | 7/10 | | 1 | 1 | 1 | | |
| | 13 | **** | 7 | | • | | 1 | | 7/15 | 4/16 | 1 | | | | |
| 6 | 14 | - | | | | | | | 7/19-20 | 4 - 7 | | | • | -2 | |
| 1 | 1/12-10 | | 46 | 6 | 36 | 13 | 7 | 47 | 9/16-18 | 4 | 16 | 13 | | | |
| 100 | 2/14-15 | 10 | | | | 1 | | 72 | 11/10 | 4 2 E | | - | | | |
| 9 | 1/28 | | 15 | 17 | 14 | i | | | 11/30-12/3 | 16 | | 10 | | | |
| 43 | 0/16 | # 11 7 | | 3 | | 1 | 10 | 1 | 1 | STUMBS | | • | | | 1 |
| 18 | 0/20 | # 10 | | | 7 | 1 | | | HIE. | | •• | 78 | 50 | 17 | - |
| | 9/24-25 | # 16 | 31 | 41 | 37 | 1 | • | | 415 | 24 | 614 | 900 | 060 | 151 | |
| 3 | 10/24-25 | E A E | | 7 | • | | | | | OF FREE PARK | | | 1 | | 1000 |

表一附.5 気象要因別による防放場等の被災施設数 Table 3 (appendix).

(bann) 2003) (with rough) I alout

3-2

*

GUAR.

an (sec)

Table 3 (appendix). Breakdown of damaged facilities by meteorological elements.

Key:

- 1. Year
- 2. Date
- 3. Designation of meteorological element
- Number of harbors
- 5. Number of facilities
- 6. Breakdown of facilities by cost of restoration
- 7. Less than 10 million yen
- 8. 10-30 million yen
- 9. More than 30 million yen
- 10. Low pressure system
- 11. Typhoon
- 12. Flooding from heavy rains
- 13. Winter wind waves, etc.
 14. Flooding from melting snow
 15. Total
- 16. Earthquake

APPENDIX

NE DE SANTOS SANTOS COM COMES DE SANTOS DE SAN

Figures 1-18. Tracks of various storms.

1 + 36 - 51

--- BES ---

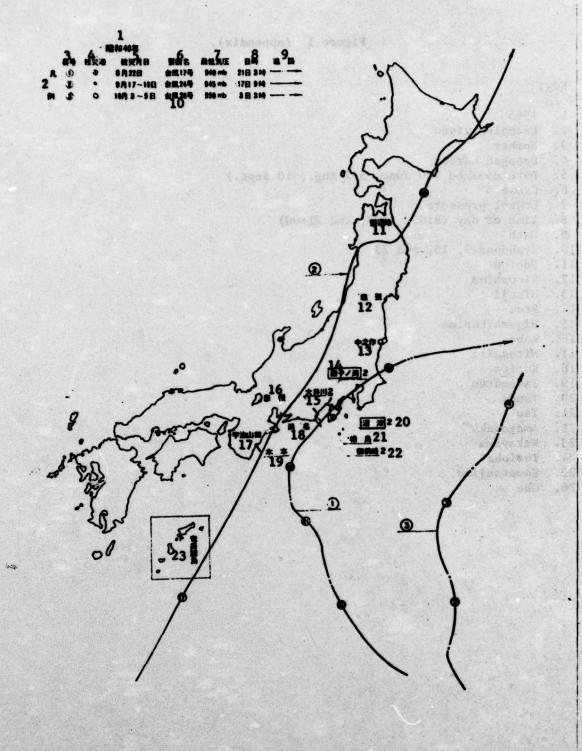
Figure 1 (appendix).

Key:

- 1. 1965
- 2. Examples given
- 3. Number
- 4. Damaged harbor
- 5. Date damaged (20 June, 5-7 Aug., 10 Sept.)
- 6. Cause
- 7. Lowest pressure
- 8. Time of day (9:00, 3:00, and 21:00)
- 9. Path
- 10. Typhoons 9, 15, and 23
- 11. Udetsu
- 12. Einoshima
- 13. Himeji
- 14. Etsu
- 15. Higashiharima
- 16. Kobe
- 17. Mitashiri
- 18. Karita
- 19. Takamatsu
- 20. Tsuda
- 21. Tsu
- 22. Amagasaki
- 23. Wakayama
- 24. Tomioka
- 25. Komatsujima
- 26. Obe

女士師・鶏

-- 982



間一附・2

- 239 -

Figure 2 (appendix).

10 000 DOME 150 DOME 1 10 DOME 1 1

Key:

- 1. 1965
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (22 Aug., 17-18 Sept., 3-5 Oct.)
- 6. Name of storm
- 7. Lowest pressure
- 8. Time (3:00, 9:00, 3:00)
- 9. Path
- 10. Typhoons 17, 24, and 28
- 11. Noheji
- 12. Shiogama
- 13. Nakanosaku
- 14. Tagonoura
- 15. Oigawa
- 16. Hikone
- 17. Ujiyamata
- 18. Hamana
- 19. Kimoto
- 20. Numazu
- 21. Nagara
- 22. Omaezaki
- 23. Amami Islands

5×微…圆

THE DAY WAS

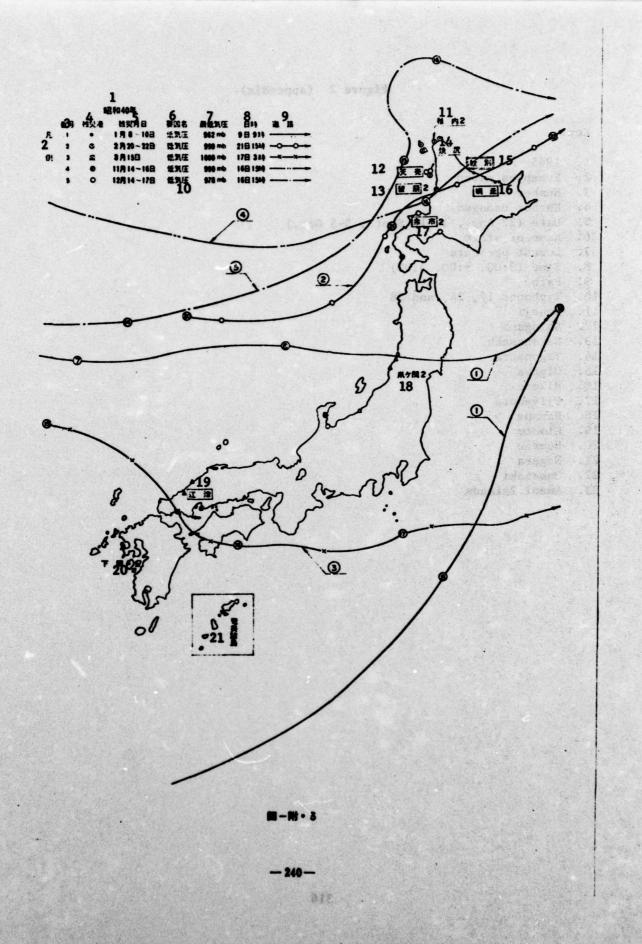


Figure 3 (appendix).

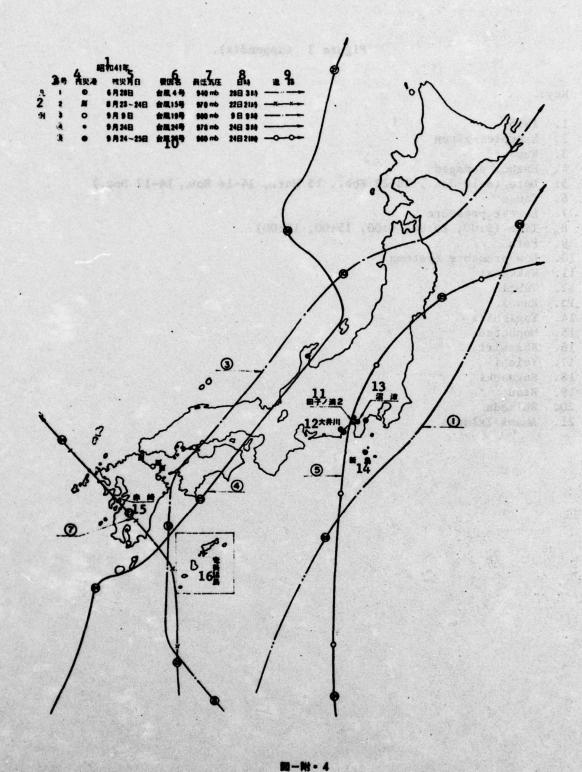
of a classification of a series of the court of the court

Key:

- 1. 1965
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (8-10 Jan., 20-22 Feb., 15 Mar., 14-16 Nov., 14-17 Dec.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (9:00, 15:00, 3:00, 15:00, 15:00)
- 9. Path
- 10. Low pressure systems
- 11. Wakkanai
- 12. Teuri
- 13. Rumoi
- 14. Yagishiri
- 15. Monbetsu
- 16. Abashiri
- 17. Yoichi
- 18. Sugaseki
- 19. Etsu
- 20. Shimoda
- 21. Amami Islands

加上個一個

all Maria



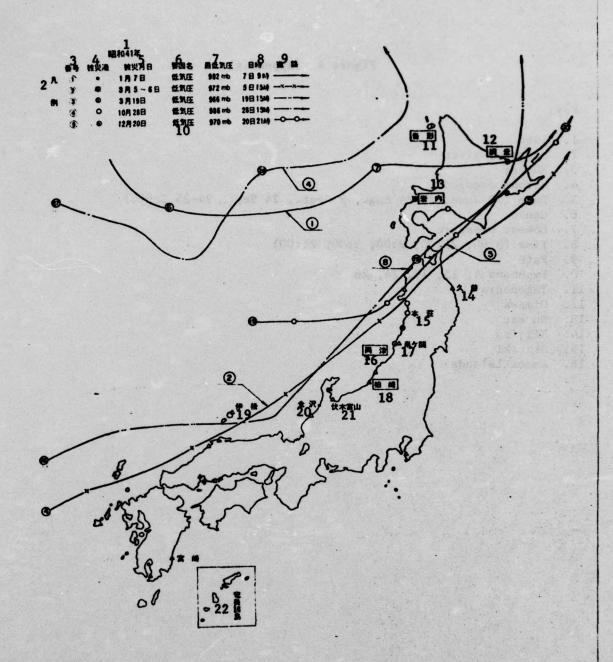
- 241 -

Figure 4 (appendix).

Key:

- 1966
 Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (28 June, 23-24 Aug., 9 Sept., 24 Sept., 24-25 Sept.)
- 6. Cause
- 7. Lowest pressure
- Time (3:00, 21:00, 9:00, 3:00, 21:00)
- 9. Path
- 10. Typhoons 4, 15, 19, 24, 26
- 11. Tagonoura
- 12. Oigawa
- 13. Numazu
- 14. Niijima
- 15. Akazaki
- 16. Amami Islands

型。閉一機

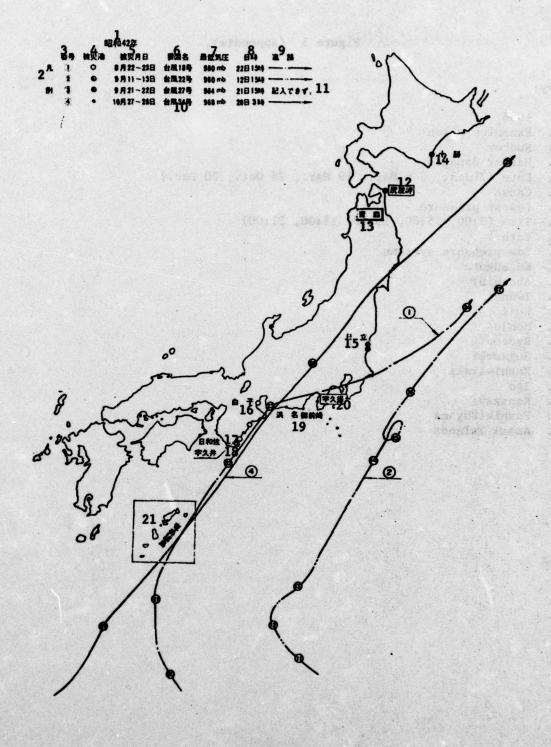


四一附・5

Figure 5 (appendix).

Key:

- 1. 1966
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (7 Jan., 5-6 Mar., 19 Mar., 28 Oct., 20 Dec.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (9:00, 15:00, 15:00, 15:00, 21:00)
- 9. Path
- 10. Low pressure systems
- 11. Kutsugata
- 12. Abashiri
- 13. Iwanai
- 14. Kuji
- 15. Honjo
- 16. Ryotsu
- 17. Sugaseki
- 18. Kashiwazaki
- 19. Igo
- 20. Kanazawa
- 21. Fushikitoyama
- 22. Amami Islands



M-M . 6

- 243 -

Figure 6 (appendix).

AND THE WORLD STORY

rake ada water she of

BIVER

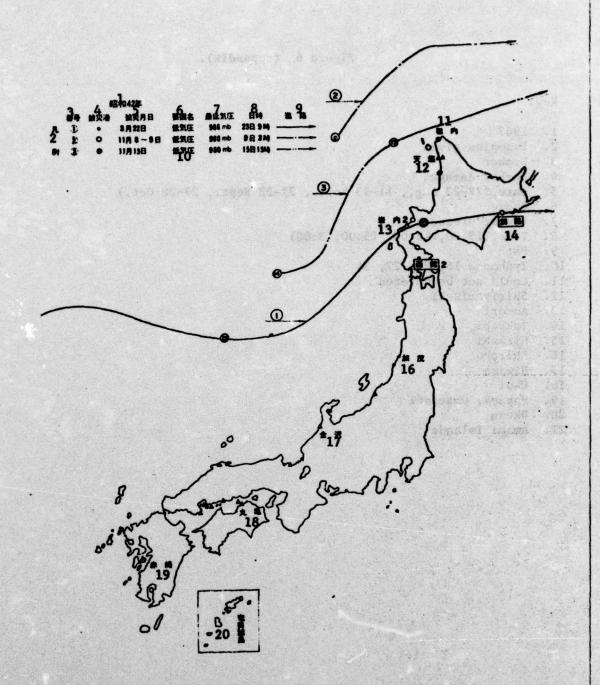
通ない 新 内容

Key:

- 1. 1967
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (22-23 Aug., 11-13 Sept., 21-22 Sept., 27-28 Oct.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (15:00, 15:00, 15:00, 3:00)
- 9. Path
- 10. Typhoons 18, 22, 27, 34
- 11. Could not be entered
- 12. Shiriyamisaki
- 13. Aomori
- 14. Tokachi
- 15. Hitachi
- 16. Shiroko
- 17. Hiwasa
- 18. Ukui
- 19. Hamana, Omaezaki
- 20. Ukusu
- 21. Amami Islands

七十四一個

- 28% --



B_W . 7

- 244-

355

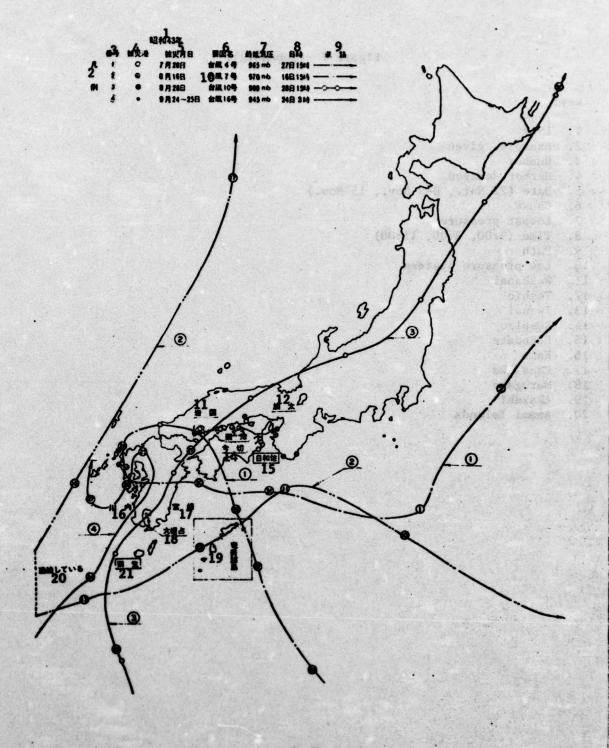
Figure 7 (appendix).

Key:

- 1. 1967
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (22 Mar., 8-9 Nov., 15 Nov.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (9:00, 3:00, 15:00)
- 9. Path
- 10. Low pressure systems
- 11. Wakkanai
- 12. Teshio
- 13. Iwanai
- 14. Kushiro
- 15. Hakodate
- 16. Kamo
- 17. Kanazawa
- 18. Marugame
- 19. Akazaki
- 20. Amami Islands

在 一個 一個

--- Cat ----



間一階・8

121

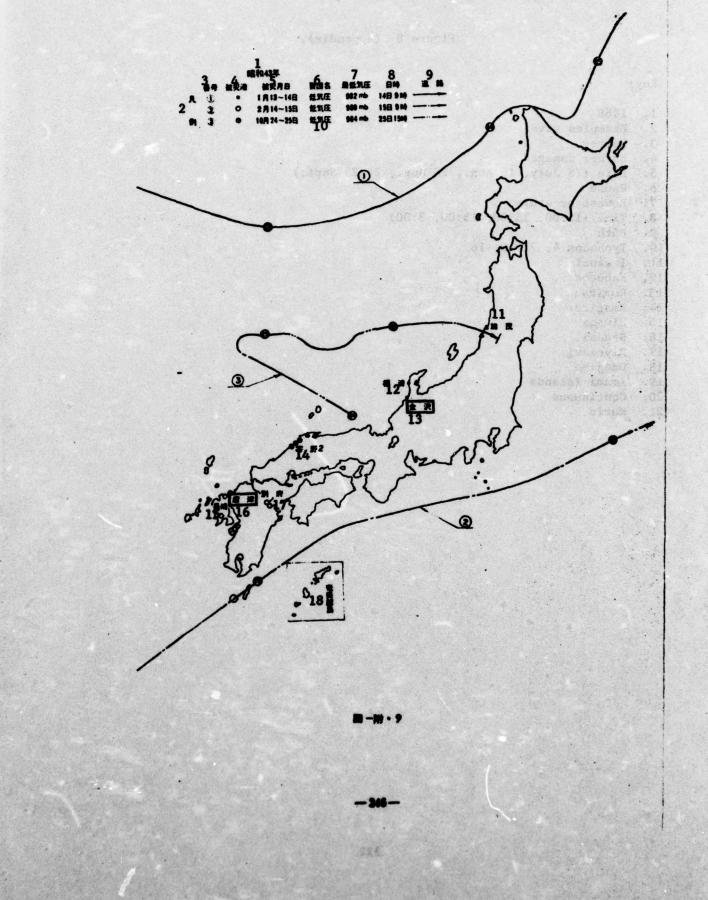
Figure 8 (appendix).

Key:

- 1. 1968
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (28 July, 16 Aug., 28 Aug., 24-25 Sept.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (15:00, 15:00, 15:00, 3:00)
- 9. Path
- 10. Typhoons 4, 7, 10, 16
- 11. Iwakuni
- 12. Kabuto
- 13. Kuritsu
- 14. Imagire
- 15. Hiwasa
- 16. Sendai
- 17. Miyazaki
- 18. Onejime
- 19. Amami Islands
- 20. Continuous
- 21. Kurio

and the same

至中國一部



[manual]

Figure 9 (appendix).

Key:

- 1. 1968
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (13-14 Jan., 14-15 Feb., 24-25 Oct.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (9:00, 9:00, 15:00)
- 9. Path
- 10. Low pressure systems
- 11. Kamo
- 12. Fukuzu
- 13. Kanazawa
- 14. Takuno
- 15. Nagasaki
- 16. Karatsu
- 17. Beppu
- 18. Amami Islands

+1.50.0 -+

经中期一流

1870年 1877日 東田名 田伝元王 日刊 1874日 出版7号 905 mb 4日213年 1872~23日 負責9号 900 mb 22日 91号 .0 0 **四一附・10**

-247-

PER

Interpretate Interpretate Control Control

- Interested

1

and framed frames.

Figure 10 (appendix).

on these after the color of the

Key:

- 1969
- 2. Examples given
 3. Number
- 4. Harbor damaged
- 5. Date (4 Aug., 22-23 Aug.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (21:00, 9:00)
- 9. Path
- 10. Typhoons 7, 9
- Shiroko 11.
- 12. Mimitsu
- 13. Kagoshima
- 14. Amami Islands

7.7 第一級

M _ M - 11

Figure 11 (appendix).

Key:

- 1. 1969
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (5-6 Feb., 13 March)
- 6. Cause
- 7. Lowest pressure
- 8. Time (9:00, 21:00)
- 9. Path
- 10. Low pressure systems
- 11. Kutsugata
- 12. Teshio
- 13. Teuri
- 14. Yagishiri
- 15. Ishikari
- 16. Iwanai
- 17. Tokachi
- 18. Shiriyamisaki
- 19. Kuji 20. Miyako
- 21. Sugaseki
- 22. Tottori
- 23. Sendai
- 24. Amami Islands

- 965 ···

53 - MI- 58

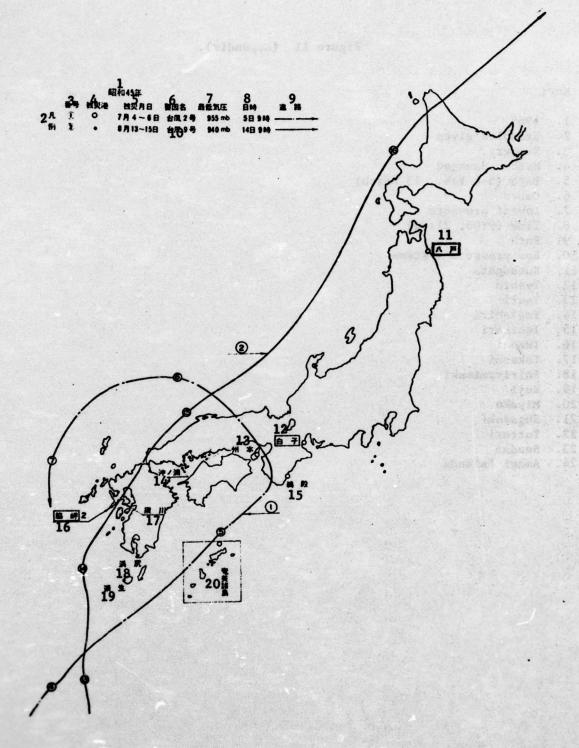


図-附・12

Figure 12 (appendix).

Key:

- 1970 1.
- 2. Examples given
- Number
- Harbor damaged
- 5. Date (4-6 July, 13-15 Aug.)
- 6. Cause
- Lowest pressure
- 8. Time (9:00, 9:00)
- 9. Path
- 10. Typhoons 2, 9
- 11. Hachinohe
- 12. Shiroko
- 13. Kunimoto 14. Okinoura
- 15. Niwatorisama
- Wakizaki 16.
- 17. Sugawa
- 18. Hamashiri
- 19. Kurio
- 20. Amami Islands

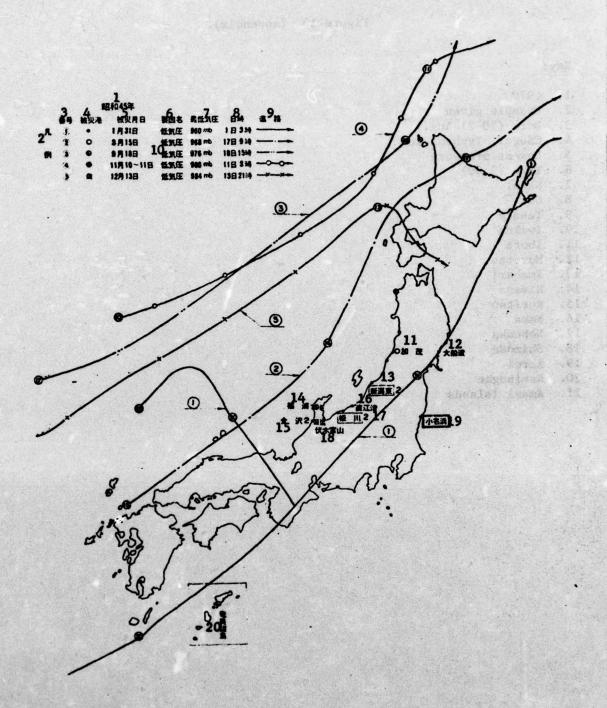
21、海上海

Figure 13 (appendix).

Key:

- 1. 1970
- 2. Example given
- Date (20-21 Aug.) 3.
- 4. Cause: Typhoon 10
- 5. Lowest pressure
- 6. Time (9:00)
- 7. Sakai
- Omi 8.
- Tasaka 9.
- 10. Iwakuni
- 11. Ibota
- 12. Murotsu
- 13. Imabari
- 14. Hiwasa
- 15. Kuritsu
- 16. Naka
- 17. Nobeoka
- 18. Shimoda
- 19. Kurei 20. Kaminogae
- 21. Amami Islands

3/ 本公內銀一圈



四一附 - 14

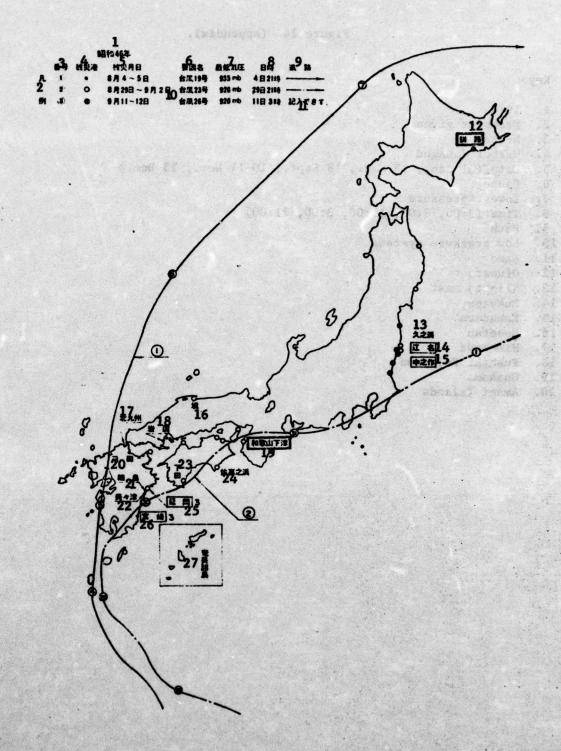
Figure 14 (appendix).

The first place with the first property of the first property of the first property of the first party of th

Key:

- 1. 1970
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (31 Jan., 15 Mar., 18 Sept., 10-11 Nov., 13 Dec.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (3:00, 9:00, 15:00, 3:00, 21:00)
- 9. Path
- 10. Low pressure systems
- 11. Kamo
- 12. Ofunato
- 13. Niigata east
- 14. Fukutsu
- 15. Kanazawa
- 16. Naoetsu
- 17. Himekawa
- 18. Fushiki Fujiyama
- 19. Onahama
- 20. Amami Islands

高利。個一級(



四一时 - 15

Figure 16 (appendix).

man sin

* 100 TUE

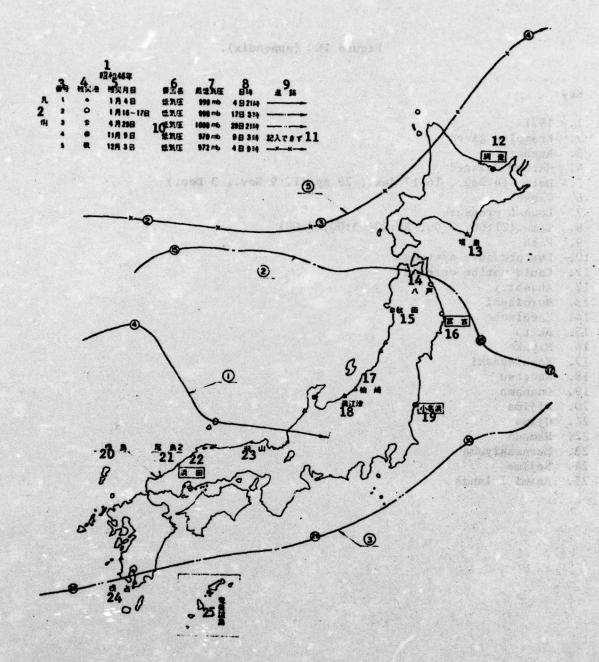
sea Con divises

Key:

- 1. 1971
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (4 Jan., 16-17 Jan., 29 April, 9 Nov., 3 Dec.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (21:00, 3:00, 21:00, 3:00, 9:00)
- 9. Path
- 10. Low pressure systems
- 11. Could not be entered
- 12. Abashiri
- 13. Horoizumi
- 14. Hachinohe
- 15. Akita
- 16. Miyako
- 17. Kashiwazaki
- 18. Naoetsu
- 19. Onahama
- 20. Aijima
- 21. Ojima
- 22. Hamada
- 23. Murasakiyama
- 24. Nejime
- 25. Amami Islands

-- CES ---

A 1 - 104 - 108



岡-附・16

中型是

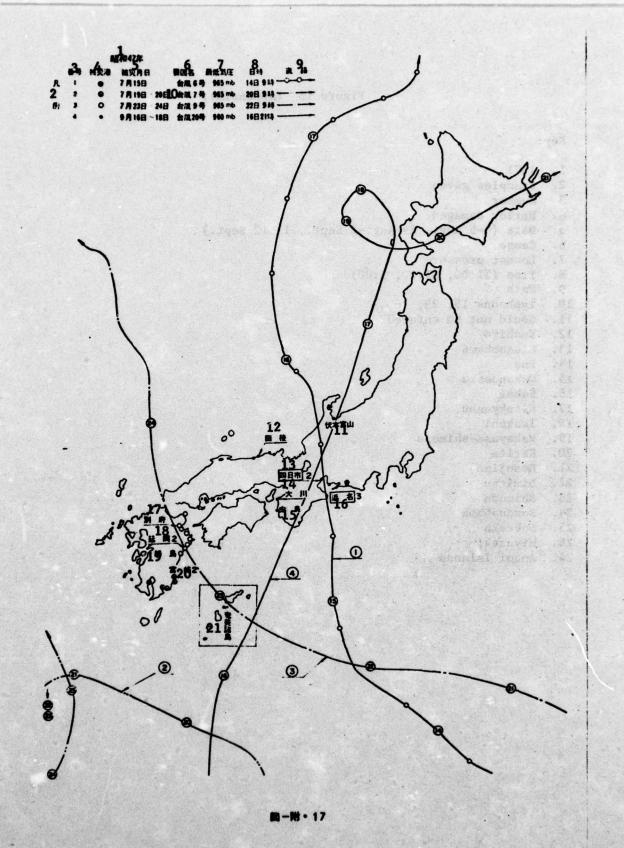
Figure 15 (appendix).

Key:

- 1. 1971
- 2. Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (4-5 Aug., 29 Aug.-2 Sept., 11-12 Sept.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (21:00, 21:00, 3:00)
- 9. Path
- 10. Typhoons 19, 23, 26
- 11. Could not be entered
- 12. Kushiro
- 13. Hisanohama
- 14. Ena
- 15. Nakanosaku
- 16. Sakai
- 17. Kitakyushu
- 18. Iwakuni
- 19. Wakayama-shimozu
- 20. Karita
- 21. Hosojima
- 22. Mimitsu
- 23. Shimoda
- 24. Sazenohama
- 25. Nobeoka
- 26. Miyazaki
- 24. Amami Islands

てする物の機

-- \$25 ---



-- 254 --

e 17 (appendix). Figure 17 (appendix).

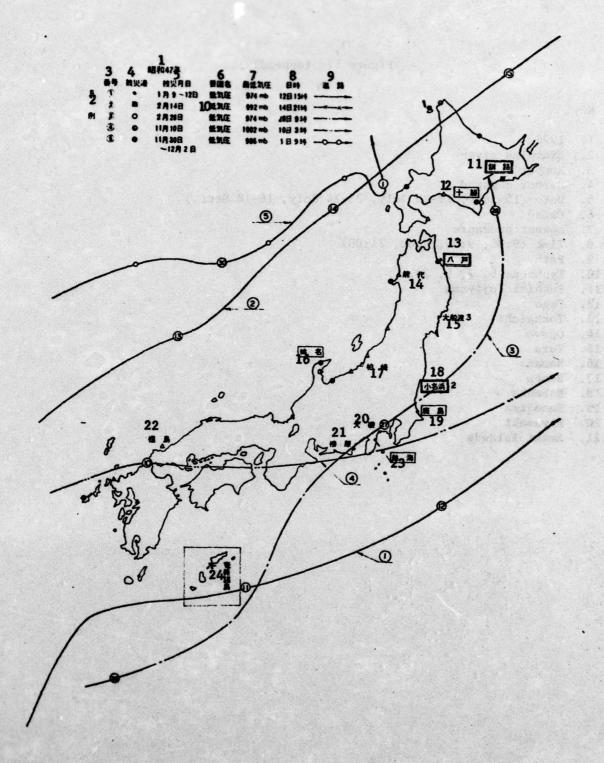
Key:

- 1. 1972
- Examples given
- Number
- 4. Harbor damaged
- 5. Date (15 July, 19-20 July, 23-24 July, 16-18 Sept.)
- 7. Lowest pressure
- 8. Time (9:00, 9:00, 9:00, 21:00)
- 9. Path
- 10. Typhoons 6, 7, 9, 20
- 11. Fushiki Fujiyama
- 12. Tago
- 13. Yokkaichi
- 14. Ogawa
- 15. Yura
- 16. Hamana
- 17. Beppu
- 18. Nobeoka

- 19. Hosojima 20. Miyazaki 21. Amami Islands

84-第一组

Same of the same



岡-附・18

Figure 18 (appendix).

Key:

- 1. 1972
- Examples given
- 3. Number
- 4. Harbor damaged
- 5. Date (9-12 Jan., 14 Feb., 28 Feb., 10 Nov., 30 Nov., 2 Dec.)
- 6. Cause
- 7. Lowest pressure
- 8. Time (15:00, 21:00, 9:00, 3:00, 9:00)
- 9. Path
- 10. Low pressure systems
- 11. Kushiro
- 12. Tokachi
- 13. Hachinohe
- 14. Noshiro
- 15. Ofunato
- 16. Wana
- 17. Kashiwazaki
- 18. Onahama
- 19. Kashima
- 20. Oiso
- 21. Haibara
- 22. Aijima
- 23. Atami
- 24. Amami Islands